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Education Symposium

DEVELOPMENT OF A FACULTY FOR SCHOOLS OF MEDICAL TECHNOLOGY

INTRODUCTION*

ROBERT BRILL, M.D.
Director of Laboratory Service, St. Mary's Hospital, Passaic, New Jersey

Every one recognizes the teaching role of the Educational Director of a school of medical technology and also the role of those senior technologists who contribute to the class room instruction and to the practical guidance to the student working under supervision. But teaching does not end with merely the giving of a class or the giving of practical instruction. In every contact with other personnel in the hospital: physicians, nurses, aides, the response of the medical technologist to questions, to requests, to orders, impresses the student technologist in the development of a superior or inferior professional personality. The example set by the graduate medical technologist by the meticulous attention to detail, by the reasonableness in accepting a STAT request when already over-burdened, by the willingness to stay another ten or fifteen minutes to complete an important procedure on a critically ill patient, these are as important, if not more important, in the development of the future medical technologist, than didactic class room instruction and well planned written exams.

This, leads to what I consider the fundamental contribution of the student medical technologist. The student is not present for service, not present as an extra pair of hands to be used by the senior technologists as they see fit. Nor is the student there only to learn, and later to take her place in the ranks of medical technology. Rather, most important, the student stimulates the more mature members of the profession to ever-increasing stature in medical technology proficiency. Just as the presence of interns in a good teaching hospital stimulates the physicians to ever improving medical care for the benefit of all patients, so the presence of student medical technologists stimulates the graduate technologists to ever impoved caliber of clinical pathology.

Let these be my words you remember: "A school of medical technology **is** worth the effort" and "**every** medical technologist is a teacher."

* Read before the 28th Annual Convention of ASMT, Atlantic City, New Jersey, June 1960.

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SELECTION AND ASSIGNMENT OF FACULTY IN SCHOOLS OF MEDICAL TECHNOLOGY*

W. G. HUTCHINSON, Ph.D.
Dean, School of Allied Medical Professions, University of Pennsylvania, Philadelphia

As one not eligible for membership in your society, I speak as an outsider but as one intensely interested in seeing your profession advance in every way possible.

As an outsider I shall feel free to speak frankly and to do so without fear of excommunication with the belief that sometimes an outsider may help to bring into focus certain problems which may become blurred by the close scrutiny of the insider. It is, however, just as possible that the outsider may hopelessly distort something clearly seen by intraspection.

I have been asked to speak to you on the topic "Selection and Assignment of Faculty in Schools of Medical Technology." Perhaps the simplest suggestion would be that one selects a faculty for Schools of Medical Technology in the same manner that selection is made in any branch of higher education. However, there are certain special considerations in the field of medical technology. One of these is the question of the fundamental purpose and aim of training programs in medical technology. Are we to train primarily for perfection of technique, or are we interested as well in equipping our students with as broad a liberal arts education as possible and a thorough grasp of theoretical background for the work in which they are to be engaged? Since recent changes in requirements would indicate a trend toward the latter, I will base my remarks on the assumption that such is the goal of medical technology education.

With the requirement that for registration, a medical technologist must have three years of college education, will there be any student satisfied with less than a college degree? We have come to consider as meaningless the traditional phrase so often repeated at commencement exercises—"with all the rights and privileges pertaining to this degree." However, there **are** rights and privileges, both professional and social, which belong to the college graduate and which are accompanied by proportionate responsibility. These are often eclipsed in urban life but come into sharp relief in many small communities. Women are perhaps more aware than men of such privileges. As you know the American Association of University Women—an organization powerful in both educational and social realms—offers membership to women whose college training has been only in such programs as have been approved by the Association. Especially in a small community one is essentially ostracized if turned down for membership.

I recognize that the demand for hospital laboratory help is such that it cannot possibly be met for much time to come by the college trained technologist alone. There is need for many laboratory aides trained by the apprentice system or in special trade school courses.

* Panel Discussion: Development of a Faculty for Schools of Medical Technology—Read before the 28th Annual Convention of ASMT, Atlantic City, New Jersey, June 1960.

The requirement for three years of college education for registration emphasizes a problem which is a familiar one in those colleges and universities where a degree program in medical technology is already in operation. This is the problem of the senior year. Should it be spent in the hospital laboratory or on the college campus with the requirement for a fifth year to be spent in the hospital? If I am correctly informed, the majority of such programs attempt to encompass the requirement for twelve months of hospital work within the four years of college. The remuneration of a medical technologist is such that I cannot believe that a five year program would attract many students in these days of constantly increasing tuition.

Does responsibility for training medical technologists reside within the college offering the degree or in the hospital laboratory or to what extent may this be divided? It is my firm belief that the college offering the degree must assume full responsibility for this training. This means that the hospital laboratory complementing such training must be approved by the college on the basis of the suitability of its personnel to serve as extramural members of the college faculty. If the college is to assign academic credit for work done in the hospital laboratory, it must exercise jurisdiction in the selection of personnel as well as in the course of study.

There appears to be an unfortunate tendency to consider as medical technology training only that work done in the hospital. Certainly each of the four years contributes to the education of the medical technologist and the entire program should be considered as a continuing entity and not divided into **pre** medical technology and the professional training of the hospital. This concept leads me to suggest that accreditation belongs not to the hospital laboratory but to the college sponsoring and directing the entire program. To my mind by far the weakest element in medical technology education today is what seems to be generally accepted as the eleventh commandment—thou shalt not spend less than twelve months in the hospital laboratory. That only this portion of the entire educational program should receive the designation of "School of Medical Technology" certainly demands rethinking on the part of the Registry.

Putting aside all tradition and prejudice is it **really** essential that there be **any** hospital internship? The major curriculum in the college or university including required courses in diagnostic bacteriology and serology, diagnostic chemistry, parasitology, hematology, instrumentation, etc. can give a student an excellent foundation in a four year program. The hospital should then be willing to give on-the-job training for perfection of technique. A student hired by industry often spends several months learning with precision the special techniques required. Would it not be proper that the hospital hire a technologist well trained in the college and invest in a short training period for perfection by repetition? This procedure would allow for time differences in training as an expression of differences in student ability—something completely ignored in the present twelve months requirement. While in the mood to make radical suggestions, I might point out that with the trend toward a

higher level of education and with the college and university assuming responsibility for training, the position of medical director becomes an anachronism. True, the educational institution needs help from the medical profession in its planning and implementation of a training program in medical technology. This, however, can best be supplied by a medical advisory committee, the members of which are chosen from **several** fields related to medical technology. If schools of engineering were to be forced to have a mathematical director for fear that their students' bridges would fall down, we would have an educational situation comparable to that in medical technology today.

With these preliminary matters off my chest perhaps I should get to the subject assigned me. While there will be much difference of opinion and many different approaches to the incorporation of medical technologists into the college faculty, a workable suggestion might be made. A medical technologist of proper academic accomplishment should have a faculty post and offer such courses as orientation, diagnostic bacteriology and serology, diagnostic chemistry or instrumentation in the college or university curriculum. She should also be adviser to all medical technology students beginning with the freshman year.

In addition the college might also wish to list as lecturers those members of the medical staff of the hospital who will have key positions in the teaching of the senior year—such as the clinical pathologist and the clinical chemist.

A properly qualified medical technologist who is a member of the hospital staff or who may hold a dual appointment in the hospital and the college should serve as coordinator in the hospital laboratory for students in the senior year. Such a person should be completely familiar with the educational background of the student and have good liaison with the various hospital departments.

Immediate responsibility for the teaching of the hospital year should be in the hands of the medical staff and properly qualified medical technologists. To be avoided is the apprenticeship training which, of course, is the easiest thing to do in a busy and commonly understaffed laboratory. That college seniors should receive instruction from less than their peers is educationally unsound. Thus the college has the right to insist that the extramural faculty of the hospital shall consist for the most part of those holding college degrees. One cannot of course exclude the occasional technician of long experience who has taken such advantage of every opportunity that she has made significant contributions to the profession and its literature. Lectures on advanced theory, seminars with student participation, and frequent examinations should serve to coordinate the student's background with the practical laboratory work. Frequent reports on student progress should be sent to the college and consultations with college faculty encouraged.

An attempt to explain what I mean by a medical technologist qualified for teaching leads me to discuss bases for selection of faculty for medical technology schools. The acceptance by many colleges and universities of educational programs in medical technology places upon the profession as a whole the responsibility of providing members of its

body who are equipped for membership on a college faculty and, take it from one who knows, such people are difficult to find. This means first of all that there has been graduate work in one of the specialties—bacteriology, biochemistry, histology, hematology, etc.—at least to the masters level and preferably to the Ph.D. level. It means too that the individual must be equipped to do original investigation in the field of his special talent. There is a tendency for those in fields allied to medicine to be content to do a good job of teaching on the college level but to neglect the equally important obligation of research. While college administrations are inclined to be tolerant of young and growing professions, growth must be demonstrated and productivity realized if the educational program is to be continued. It is, of course, also essential that the teaching technologist shall have had a certain minimum of practical experience in the hospital laboratory.

It seems to me that if medical technology is to advance to an increasingly respected medical profession, there must be a willingness to accept certain changes in fundamental concepts. Emphasis must be shifted from the teaching laboratory of the hospital to the college or university classroom and laboratory. The colleges and universities must be in a position to respect the degress they are awarding.

I can assure you that it is with no sense of animosity that I have framed my remarks but with the wish that the profession of medical technology might present a united front in its advance to better recognition. To this end I would urge that medical technology faculty be persons of sincere dedication, well informed professionally and well educated. And may I point out that these are by no means synonomous terms.

IN MEMORIAM

— 1960 —

We wish to express our sincere sympathy to the families and friends of:

Samuel Feder, New Jersey

Lila Jean Risty, South Dakota

Hattie M. Arthur, Arkansas

Lawrence P. Ambrogi, D. C.

Geraldine H. D. Barton, Ohio

HOW TO INTEREST MEDICAL TECHNOLOGISTS IN TEACHING*

CATHERINE MILOS
Co-ordinator of Medical Technology, Fairleigh Dickinson University, New Jersey

Perhaps you are fortunate to be in an area where there is a surplus of medical technologists both willing and able to teach students, but this is not such an area, and from perusal of our medical technology journals, I have gathered there are other areas similarly afflicted. In fact, I have come to regard the lack of development of an adequate corps of qualified teachers as the main stumbling block of our present educational program.

It is a sad but undeniable fact that while some medical technologists were born to teach and others achieved and like to teach, most medical technologists find teaching suddenly thrust upon them in the course of a job they supposed involved only diagnostic work. Necessity being the mother of many things beside invention, many of my generation found it was a case of teach or perish as far as the maintainance of an adequate laboratory staff was concerned. Under such circumstances, too many medical technologists developed a distatse for teaching, or felt themselves totally inadequate to the situation involving two roles and withdrew from the program. In many cases the student medical technologist has been the ultimate sufferer.

With the establishment and approval of over 700 hospital schools of medical technology, it has become obvious that the role of teaching technologist is going to be one of increasing significance and importance for the future. Increasing demands upon student medical technologists make the quality of teaching they receive more important each year. Good teaching demands not only a comprehensive knowledge of the subject to be taught, but also a working knowledge of teaching methodology. An adequate understanding of how students learn, and why they sometimes fail to learn, as well as an ability to provide experiences which will help the student through his own efforts to discover and develop his best potentialities are equally essential. There is also a certain undefinable quality to good teaching which makes students remember some teachers throughout their lifetime with gratitude for the contribution they have made to their professional and personal development. Where are we to find these teachers, so desperately needed for the future of our own profession?

I am appalled at the number of schools of medical technology in which teaching supervisors are not even medical technologists, but whose primary loyalties are to other disciplines. I feel very strongly that this is primarily a medical technology problem, and that the solution must be found within our own group. I think we have the necessary potential; but we must find, encourage, and educate the future teachers of medical technology. We must also provide them with the necessary

* Panel Discussion: Development of a Faculty for Schools of Medical Technology—Read before the 28th Annual Convention of ASMT, Atlantic City, New Jersey, June 1960.

tools, and an adequate sphere in which to work.

It seems to me that we are missing out on many opportunities to do this because we have not fully recognized this as a problem to be incorporated into our state and national society programs and I would like to present a few suggestions which might be helpful. In the long process during which a student becomes an experienced medical technologist there are many points of contact at which the desire and ability to teach can be recognized, can be lost, or can be strengthened.

Let us start at the beginning with recruitment. Are we pointing out to HS students thinking of a teaching career in science, that both can be combined in a medical technology career? There was a student in N.J. last year, almost lost to medical technology because she thought she had to make a choice between teaching and medical technology. Luckily, through a visit to a local school of medical technology she became aware of opportunities for teaching in our field, and she is presently happy in an undergraduate medical technology program, already definitely oriented to a teaching job in a school of medical technology after graduation. Teaching should certainly be mentioned as a possibility in all recruitment literature, and by all speakers on vocational guidance programs.

During the undergraduate years in college students should be brought in contact with the teaching supervisors they will later know in the hospital. In making a point of this in our Medical Science Orientation course at the university this year, we were agreeably surprised at the warmth and strength of the relationships which developed. Many students asked for and received permission for hospital visits in which they could see for themselves the role of teaching supervisors. During the course, the laboratory staff organization was explained to them, and the possibilities of teaching and supervising positions as promotions were pointed out. Most students had never heard of medical technologists in these positions before. If students are interested, the advisability of taking education or personnel management courses as electives, or as additional courses should be mentioned.

During the internship year, many opportunities will arise for observing whether the student has any natural teaching ability. If so, experiences which will aid in developing further skill and self-confidence should be provided. Some of our schools of medical technology do regularly incorporate such experiences as part of the training program, by having senior students take part in teaching practical techniques to junior students, laboratory assistants, or internes. These teaching experiences usually result in greater command of the subject matter and an acceptance of teaching as a part of the normal activity of a medical technologist. In many hospitals, the prevailing attitude of the teaching staff will determine the student's attitude toward teaching. If she is indoctrinated with the attitude that all scientific personnel have some obligation to pass their knowledge along to others, she will grow to regard it as a natural part of her duties. If the staff seems to resent its teaching obligations, the student will easily acquire this attitude also.

What of the medical technologist who has finished training and assumed her first position? Here again, there are many influences which

can play their part in whether she will want to, and will enjoy teaching. In too many areas staff policies can turn many of our potentially better teachers away from teaching. Too often medical technologists are assigned to full-time diagnostic work, and then asked to assume teaching responsibilities without any adequate time allowance for preparation and presentation, and without any extra recognition or compensation for the extra work involved. It is little wonder that sometimes medical technologists learn to dislike students and heave a sigh of relief when they are not present, or that they pack up and leave positions with schools of medical technology.

Extensive work could be done possibly through pathologist-medical technologist liaison committees, or through recommendations originating with state associations of teaching supervisors towards creating the atmosphere in which the teacher can do her best work. Pathologists and hospital administrators, and personnel officers in many cases, may need more information than they presently have on the duties of teachers of medical technology. An adequate supply of teachers is dependent upon adequate recognition of those charged with teaching responsibilities.

Every school of medical technology needs to have regular meetings of its teaching staff for the purpose of coping with teaching problems, for continual improvement of the curriculum to keep it abreast of recent developments in research, and for the maintenance of teacher morale. We also need to get groups of medical technologists who are teaching or who are interested in teaching, together on a state-wide or area basis. These groups should be organized and they should meet regularly. It is surprising how much easier it is to bear up under your own problems when you know someone else is coping with the same thing. Or you may find someone who has successfully worked out the same problem you have. Continuing education is essential for teachers too, and speakers on subjects of interest only to teachers can be included in such meetings. Exchanges of curricula, lesson-planning, audio-visual aids, and other teaching materials will be found mutually helpful. Such meetings may lead to consideration of the advantages of group teaching of some subjects for all hospital students in one area, by the person most highly qualified in a given specialty.

Nationally, we are beginning to develop graduate programs in medical technology with the emphasis on teaching and administration. Medical technologists should be encouraged to take advantage of these, and financial aid should be found for graduate students within each state. On returning to their own program, these graduate students can have a profound influence on other schools in their area, and should be encouraged to contribute to state meetings of teaching supervisors.

Our whole program this afternoon is experimental. Originally we had planned a teachers' institute to precede the convention or follow it, when at least two whole days could be spent on the problems of teaching medical technology. But we were afraid to risk its reception without first sounding out your response to a shorter discussion of such problems. We would therefore welcome your opinion on the advisability of including such programs in future conventions, and also like to know

your choices regarding topics for discussion. There seems to be an urgent need for activation of a national program for teachers of medical technology.

It is pertinent perhaps to ask ourselves why do teachers teach—and I think the only adequate answer is because they must—they could not be truly happy doing anything else. I once heard of the definition of a career as the kind of a job which, if you could not find someone willing to pay you to do, you would be willing to pay someone to let you do. I think really good teachers feel very much like this about their work.

I am very serious in my belief that a great deal of the future of medical technology depends on the way in which teaching technologists organize themselves in the near future, the kinds of programs they promote, and their ability to encourage the next generation of technologists to find the deep satisfactions and rewards of teaching which they have experienced. Medical technology can progress no further than the competency and inspiration we give our students. The history of the advancement of any profession is marked by the teachers its leaders remember.

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Continued on Page 15

FACULTY IN-SERVICE EDUCATION PROGRAMS*

D. WILLARD ZAHN, D.Sc. in Ed.
*Dean, Teachers College,** Temple University, Philadelphia, Pa.*

There are institutions of higher learning, including, of course, professional education that seem to have disregarded completely the necessity for planning the improvement of instruction. Whatever the historical background of this matter it has come to be accepted that mere knowledge of subject matter, no matter how technical and exclusive, hardly guarantees an effective teaching-learning situation. The very general acceptance of the term "teacher education" as compared with the previously prevalent "teacher training" certifies philosophically to the presence of both intrinsic and extrinsic elements in the constellation of forces which make for so-called "teaching effectiveness."

The development at the higher education level of faculty improvement in service has reached the point where one of our largest foundations alone has before it for grant consideration at least thirty proposals for the improvement of college teaching. 'Internship' at the college level, with carefully planned supervision—big brother and otherwise—has come into favor as a means of rounding the rough corners and quickening the pace of improvement of beginners. Faculty convocations and conventions have been devoted to the general topic of the improvement of instruction. Concurrently, on the other hand, the mere act of serving as a "graduate assistant" en route to instructorship is now seen for what it really is: a means of saving money, of reducing the 'load' of the professor, and of giving limited teaching experience and academic opportunity to worthy persons. Measured in terms of what is now known about learning, the graduate assistantship lacks many things: the usual results of this type of service, so far as teaching effectiveness is concerned, may be very good or very bad largely on a fortuitous basis.

Indeed, we are now at the threshold of a genuine movement to improve the instructional quality of all higher education. There are those who would support the down-reach, from a vertical point of view, into secondary education and transplant to higher education certain superior elements found there: certainly there are some good reasons for supporting this. There are those who would spend considerable time, energy, and money on a total examination of the objectives, processes, staff and students of higher education, including the professional fields, and determine on the basis of the unique teaching needs of higher education, how it can best be improved. This latter process appeals more to me. However, the differences, I assume, are not really very great, if approached in a proper spirit of inquiry and a due amount of intelligent skepticism as to past so-called "findings." Certainly, the job needs to be done: the future supply-demand ratios, the competition with the pressures for teachers at all levels, high salary offerings in new fields, and the geometrical increase in all knowledge will serve to accent

* Panel Discussion: Development of a Faculty for Schools of Medical Technology—Read before the 28th Annual Convention of ASMT, Atlantic City, New Jersey, June 1960.
** Recently changed to College of Education.

the necessity for the attainment of quality teaching wherever its placement.

That these forces for in-service education in medical colleges have had their effects is evident in such recent developments as the one at the University of Buffalo in a project, supported by the Commonwealth Fund, designed to test the hypothesis that "teaching practices in a medical school can be improved by an in-service program designed to provide for medical teachers a greater familiarity with fundamental educational principles."(1) A quick review reveals that the proceedings of other years as well as the 1958 ANNUAL CONGRESS ON MEDICAL EDUCATION AND LICENSURE(2) are studded with implications in this direction. For real stimulation read Dr. Hussey's brilliantly cartooned article in the same issue.(2)

(1) From an unpublished account of the planning of this program.
(2) Council on Medical Education and Hospitals: SELECTED PAPERS from the ANNUAL CONGRESS ON MEDICAL EDUCATION AND LICENSURE, Feb. 8-11, 1958.

I was personally intrigued by Dr. Ward Darley's formula, noted first in 1954, for medical education: $\frac{CM}{R}$ (TP), in which C represents the student's intellectual capacity, M his motivation, R the factors that interfere with his learning and distract his attention, and TP the medical school program. The fact that attention was directed to M and R as of importance in the teaching-learning process commands our special attention: C has always been so regarded.

In our own College of Education at Temple University we have dealt with this problem at one time or another with a medical school, a dental school, a college of osteopathy, as well as on our own campus. In addition, some of our staff members have acted as consultants to other programs in other institutions. Three patterns that have received some degree of acceptance seem to be emerging on a totally informal basis. Therefore, whatever is said here is on my own responsibility.

For purposes of analysis these three patterns may be designated:

1. A program of stimulation and orientation toward improved classroom effectiveness
2. A program in depth with similar objectives
3. A faculty convention on the improvement of instruction.

A program of stimulation and orientation

This program assumes neither to do a total job nor to cover the waterfront. Its thesis is that the selection of several basic elements in teaching-learning, chosen as representative factors, can be discussed in such manner with persons relatively unfamiliar with this content that their interest in technical improvement *as a teacher* will be stimulated to a degree that will be effective within the limits of their availability of time. Selectivity is the most important characteristic of this program.

In response to this, at least six lecture-discussion periods of not less than 90 minutes each are arranged, one or two weeks apart, on the following topics:

1. **The Psychology of Learning**—an overview with comment in greater depth on *one* selected element: 'motivation' as an element is saved for a single lecture and discussion.

2. **Motivation**—discussion in significant detail within the time alloted.
3. **The Art of Teaching**—the art of teaching from the standpoint of experience at the later adolescent or adult level: essentially this deals with effective classroom techniques and the relation of personality characteristics to college teaching.
4. **Audio-Visual Aids**—a general treatment of a wide variety of audio and visual aids, with more intensive treatment of those aids which have the greatest significance for the particular group.
5. **The Teaching of Skills**—an analysis of the most significant research findings in this relation, teaching techniques in this specialized area, and the important applications to teaching in general.
6. **Measuring Results**—Continuity, means, research, cautions.

It should be emphasized that such a program is only what it aims to be, an orientation and stimulant. It achieves permanent values only to the degree that it stimulates further and independent activity on the part of the participants. It is, therefore, important in this and all other programs that a carefully selected and annotated bibliography shall be supplied, for such programs on the part of the participant are, in reality, strictly 'fringe'. Programs of this type demand excellence in presentation, as much interaction as possible, and abundant clarity. It cannot be assumed that there will be large amounts either of new knowledge or behavioral change on the part of the group members. However, such discussions, appropriately handled, may well become either an overview phase of a more extended program, or a satisfactory orientation to new and inexperienced staff members, or stimulating to all staff members to the degree of their personal motivations. Relative ease of administration is evident: expense is low.

It is obvious that such a series can be extended in time, content, and depth of presentation. It can also be modified to provide more abundant amounts of interaction. All in all, however, it is recommended only for what it is!

A program in depth for the improvement of instruction

A significant difference between relative surface treatment and treatment in depth—for greater permanence in effect—is the planning factor. The pioneer project at the University of Buffalo involved "a planning committee comprised of members of the faculties of the School of Education, the School of Medicine, the College of Arts and Science, and members of the University administration." This committee agreed on five areas of content:

1. The teaching-learning process
2. Techniques and materials of instruction
3. Evaluation processes
4. The nature of the medical student
5. The role of medical education in higher education

This project also involved inter-disciplinary development of each of the above areas of content as follows:

1. Teaching-learning: educationist and a surgeon
2. Techniques and materials: educationist and internist

3. Evaluation: educationist and internist
4. Student nature: medical student, clinical psychologist, and a psychiatrist
5. Higher education: educationist and a pharmocologist

Furthermore, each non-medical member of the leadership teams underwent a rather lengthy period of familiarization with medical education which included observations, discussions and interviews. The medical members acted as guides in this part of the process.

In our planning for this type of program we tended to implement, and, where we could, simplify the ground-work accomplished at Buffalo, coming finally to agreement that the program ought to comprise:

1. General sessions for interested members of the medical faculty approximately once a month;
2. Intensive seminars of from 3 to 4 hours each, approximately 40 in number, preferably weekly, for content coverage and adequate discussion; and
3. Services of a qualified educational consultant housed in the medical college and available at least two days per week for consultation and follow-up.

Aware of the fact that commitment to 40 such seminars would be a practical impossibility for busy staff members, the content of the seminars was arranged so that an individual could "sign up" for the particular phase of his greatest interest in terms of complete units. This necessity was dictated also by the fact that sporadic attendance would 'kill' the program. The unit areas of seminar content were to be:

1. **General orientation** seminars: 2 seminars only; required of all; topic, the problems of medical education
2. **The teaching-learning process**: 8 seminars; topics, dynamics of learning, principles of educational psychology, learning theories, motivation, and the like
3. **Techniques and materials of instruction**: 14 seminars; topics; techniques and materials of instruction, their preparation and application, advantages and disadvantages and appropriate use. Techniques to include the lecture, laboratory, the conference, group discussion, drill. Materials will include films, mock-ups, tapes, slides, blackboard, et al.
4. **Evaluation processes**: 12 seminars; topics; appraising and recording student progress, objective tests, essay-type tests, oral examinations, interviews, check lists, rating scales, and newer-type techniques.
5. **The nature of the medical student**: 4 seminars, topics, special consideration of the medical student: his characteristics and their influence on the teaching-learning process and outcomes.

It is clear that such a plan costs money; that it is likely to be most effective in areas of abundant academic and teaching talent; that it will relate itself best to relatively large institutions; that it is sufficiently flexible to admit of change; that while it deals with medical education it is modifiable to other areas of application.

A faculty convention on the improvement of instruction

There are occasions when it seems appropriate to devote a full day or perhaps a week-end retreat to the development of a unit purpose. The improvement of instruction has those elements of common concern that lend themselves to such a pattern. Even those staff members who feel most secure in their sense of teaching adequacy find discussions of teaching efficiency quite challenging. The inexperienced newcomer is genuinely eager to learn from those already recognized as superior. The development of unity of purpose in such a 'local' convention is often the greatest value.

One of our recent all-day conventions chose the topic noted. The across-the-board committee thought in terms of 'how-to-do' help in teaching. The day, apart from the social amenities, included the following program elements:

1. **Teaching techniques I have found most helpful**
   The entire staff was divided into groups of not more than twenty members each. Each discussion group was led by a carefully selected member of the College of Liberal Arts and Sciences, who had prepared a brief provocative statement. Discussion followed. Recorders noted the essentials for later review and possibly publication. Time: 1 hour, 45 minutes.
2. **Group discussion in the college classroom**
   The total staff attended a 30 minute talk, which emphasized the essentials of group discussion and related limitations and cautions in the conduct thereof. The lecturer was a specialist in Speech, likewise from the sister college noted. Brief questioning followed.
3. **The lecture**
   Another 30 minute talk emphasized helpful points noted through long experience in the preparation and conduct of the lecturer in the college classroom. This was given by a professor who had achieved a notable reputation as a lecturer in his field. Brief questioning followed.
4. **Audio-visual Aids**
   The college specialist in this field gave a practical *demonstration* of some new devices and specified important considerations of value to the classroom teacher in reference to better known techniques and apparatus. Time: 75 minutes.
5. **Panel of recent graduates. Topic: Experiences at Temple that have proved most valuable to me in relation to teaching—**
   Six persons specially selected for their personal integrity, intellectual courage, and their ability to speak directly without offending, cited the areas of greatest helpfulness, the things they disapproved in college teaching, and made suggestions for the faculty.

Obviously, such a 'local' enterprise needs to be planned with meticulous regard for the niceties of human relationships and for the details of arrangement. Otherwise, the residue in feeling becomes a considerable deterrent for future projects of this sort.

What I have said in this brief presentation may be readily summarized. There has been a considerable effort directed toward the improvement of instruction at the higher education level, including professional education. Furthermore, this is likely to increase in scope, in number of projects, in experimentation, and in intensity, for we appear to be at the threshold of a 'movement,' the result of academic necessity and concern.

Many forces in higher education have been working toward this end in the recent past: projects have been planned and in a few cases grant supported. These projects have tended to be expressive of various degrees of depth of treatment, each offering its own unique values. Three illustrative patterns have been briefly but specifically described. The areas of study appear to have developed a fairly consistent mode, modifiable to meet varying needs in terms of the limitations of the two omnipresent exigencies, money and time.

It is hoped that the implications of this analysis may be helpful to you as you plan in terms of the improvement of instruction in the field of medical technology.

MEDICAL TECHNOLOGISTS WANTED

Wanted: Medical Technologist, ASCP certified or eligible, for new 41 bed hospital. Fully equipped laboratory. Liberal Fringe benefits. Salary open. Apply: Administrator, Memorial Hospital, Prairie du Chien, Wisconsin.

ASCP Registered Medical Technologist wanted for 50 bed hospital in Michigan Resort Area. Forty hour week, two week vacation, liberal sick leave, all meals supplied while on duty. Salary commensurate with experience. Administrator Hubbard Memorial Hospital, Bad Axe, Michigan.

Director Of Laboratory serving a thousand bed tuberculosis hospital through twelve technical and six non-technical workers. Located in progressive city of good churches and schools—two colleges. One year graduate study. ASCP registration and five years experience in clinical laboratory desired. Entrance salary $6060 with advances to $8724. 40-hour week; compensation for emergency duty; unusually good retirement system. Write H. M. Chester, Director of Personnel Services, Georgia Department of Public Health, 47 Trinity Avenue, Atlanta 3, Georgia.

Chief Medical Technologist; ASCP registered or eligible—with Masters degree to supervise laboratories and approved school in 300 bed hospital with 2 pathologists. Salary commensurate with experience. Apply Pathologist, Watts Hospital, Durham, N. C.

Medical Technologists: ASCP registered or eligible. Salary commensurate with experience. Apply Pathologist, Watts Hospital, Durham, N. C.

Medical Technologists: ASCP registered or eligible. (Individuals with equivalent experience or bachelor degree considered also.) For Hematology, Blood Bank, or Bacteriology departments of expanding 900-bed hospital located in Chicago's Medical Center. University of Illinois affiliation. Top salary for 40 hour week—5 days. Employee benefits include free individual Blue Cross Insurance after one year, sick leave accrual, three weeks vacation. Hospital owned apartments available at low rental. Send resume and photo to Personnel Department, Presbyterian-St. Luke's Hospital, 1753 West Congress Parkway, Chicago 12, Illinois.

Wanted, MT (ASCP), General Lab with emphasis Hematology, Modern 200 bed hospital, Northern New York close to Thousand Islands Recreation Area. Starting $4200-$4800 depending on qualifications. Increments, paid vacations, disability benefits, and uniforms laundered. Request qualifications and references. Apply Personnel Director, Mercy Hospital, Watertown, New York.

Medical Technologist, Registered ASCP. Excellent Salary, Fringe Benefits, and pension plan. Apply Tuxedo Memorial Hospital, Tuxedo Park, New York.

Wanted: ASCP Registered Technologist for completely new 150 bed airconditioned hospital. Vacation, Sick leave, Social Security. 1 hour drive from Atlantic Ocean beaches and Norfolk, Va. Pleasant working conditions—write or call Miss Helen Chappell, MT (ASCP), Albemarle Hospital, Inc., Elizabeth City, North Carolina.

Medical Technologists: Trained Medical Technologists, ASCP certified or eligible. Full time pathologist director of department. 340-bed hospital and clinic. **Starting rate: $325 (eligible). $350 (ASCP). Apply Personnel Dept., Robert Packer Hospital-Guthrie Clinic, Sayre, Pennsylvania.**

Medical Technologists: Registered ASCP or eligible for rapidly expanding laboratory in 340 bed hospital affiliated with Upstate Medical Center. 40-hour week; attractive scheduled salary increase program; pleasant working conditions. Apply Personnel Office, Syracuse Memorial Hospital, Syracuse, New York.

Medical Technologist, ASCP Registered or Eligible, starting salary open, based on experience, advances based on merit and tenure. Liberal personnel policies, including one of the better retirement plans. Successful candidate will report to Chief Technologist who is responsible to a full time Board Pathologist. Hospital 265 beds and expanding. Fully accredited. Located in a good North Shore Community. Contact: Director of Personnel, Victory Memorial Hospital, Waukegan, Illinois.

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STATE SOCIETY SPONSORED PROGRAMS FOR TEACHERS OF MEDICAL TECHNOLOGY*

SARA CROWSON, MT (ASCP)
1166 Crest Hill Rd., Birmingham 9, Alabama

Our Convention theme "Education: Keystone to Progress" is well chosen as our young profession improves its educational standards in order to provide for the patient the best service in our area of activity. With the three year pre-requisite for 1962 there comes a need to develop the teaching programs in all our hospitals so that we will be the academic equivalent of the fourth college year. The affiliated colleges should expect and demand this since they accept the responsibility for granting the degree following the fourth year of the three plus one combined course. 76% of our schools now have a 2 year minimum requirement. Many of us are teaching at the same time students who have had 2, 3, or 4 years of college work. This is difficult. Course content will be changed somewhat when all of our students have a minimum of three years.

In our attempts to strengthen medical technology education we are handicapped by the inadequate number of teaching technologists. We need more teachers of medical technology and continuing education programs for these teachers. We need programs of instruction for developing teachers from "line" medical technologists. The medical technologists responsible for teaching programs in our AMA-Approved Schools have accepted the challenge and are working to better this situation in a number of ways: through seminars, through workshops, through activities of the ASMT Education Committee, The TEACHING TECH and the Audio-Visual Library, and through state and local activities of teaching supervisors and faculties. Medical Technology Schools in large centers are helping by setting up post-graduate seminars and more recently, courses leading to advanced degrees in medical technology. The CHA Workshops have provided information, stimulation, and inspiration to those fortunate ones who were able to attend.

In order to obtain information regarding State Society sponsored programs for teaching technologists, a questionnaire was sent out from our Alabama Project Office in May, 1960. Also available for reference were the returns from questionnaires sent out from the NCCMT Office in August, 1959 and in March, 1960. Replies to the May questionnaire were received from 49 constituent societies. Nineteen states report that state meetings of teaching supervisors have been held. A number have been held this year for the first time. It is hoped that they will be continued. Is there a pattern for these state society sponsored programs? What form do they usually take? Thirteen of the nineteen states reporting meetings of teaching supervisors stated that they are usually held in conjunction with other meetings. These meetings have

* From the Panel Discussion: Development of a Faculty for Schools of Medical Technology, 28th Annual Convention, ASMT, Atlantic City, New Jersey, June 1960.

most frequently taken the form of discussions of problems by individuals. This is a very helpful exercise. We frequently find that someone has already worked out a good solution to a problem which is troubling us. Many of these meetings have been panel discussions. Guest speakers have been included. There have been a few workshops and seminars for teaching supervisors. Seven states report joint meetings of Directors and teaching supervisors.

The only state society which has the Teaching Supervisors Committee included in the Bylaws is Alabama. I should like to recommend this action to you. Frequently we have a spark of something good or even great which dies for lack of nurture. Through formalizing the committee in this way you will assure its continuance. Another reason for setting up the Teaching Supervisors Committee in addition to the Education Committee is the very specialized type of activity undertaken. Topics for teaching supervisors' meetings reported in returns of the questionnaire include curriculum, teaching methods and materials, school policies, selection and evaluation of students, differences between the programs in the hospital schools, college affiliation and preparation of the student. The Education Committee is charged with the responsibility of programming meetings of general interest. Adding the planning of teaching supervisor activities to these duties seems inadvisable, though you may have someone in your state willing to do both jobs.

We included in our questionnaire an inquiry regarding the types of joint activities undertaken by pathologists and medical technologists. Reports include joint meetings, scholarships, awards, recruitment activities, seminars and workshops, salary scale investigations, and legislation.

Reference to the NCCMT questionnaire returns shows that in 1960 34 states reported that they had Liaison Committees. Seven of these were new since the 1959 questionnaire. Returns of our May questionnaire shows 25 states reporting joint activities. What are those other nine Liaison Committees doing? Are they newly formed and exploring possible areas of activity in their states? If so, we would like to suggest that the sponsoring of joint meetings, seminars, and workshops for directors and teaching supervisors in states where such are feasible would make a valuable contribution to medical technology education.

Perhaps through cooperative planning, regional meetings could be worked out for those states where schools are few and distances are great. Mary Frances James reports that a three state seminar is being planned for October 22, by Mississippi, Tennessee and Louisiana. One full afternoon session will be devoted to a discussion of medical technology education.

We wish to determine how you felt about the value of these activities so we included this question: What local activity has contributed most to the improvement of medical technology in your state? Replies include: improved liaison between pathologists and medical technologists; Teaching Supervisors Committee; closer liaison with colleges; seminars and post-graduate workshop; increased interest in the teaching

Tabulation of Alabama Project Questionnaire, May 1960

X—yes
0—no

State	q. 1	q. 2	q. 3	q. 4	q. 5	q. 6	q. 7	q. 8	q. 9	q. 9. b.	q. 10	q. 11	q. 12 Additional Information
Alabama	X	X	X	varies	a, b, c, d, e	teaching aids, Orientation, student evaluation, visual aids.	X	X	0	0	Annual meetings scholarship	Student, Award, T. S. Committee	A. June 10, b. c.
Alaska*													
Arizona	0	0	0	0	.....	.....	0	0	0	.....	Bi-annual meetings seminars, workshops awards.	affiliated courses at U. of Arizona	c.
Arkansas	0	0	0	0	.....	.....	0	0	0	.....	Liaison Committee (Griev-Comm.)	ASSMT recruitment program	a, c (occasional)
California	0	0	0	.....	.....	.....	0	0	0	.....	Committee for Technologists	State Law	c
Colorado**	0	0	0	0	panel at state MT meetings	teaching problems	0	0	0	.....	Med. Tech. Ed. Fund Corp. Joint Ed. Comm. Interprofessional Relations Comm.	Improved liaison between Techs. and Paths.	a, b, c, d, programs for colleges-1961 U. of Col. Postgraduate courses to include **teaching** M. T.
Connecticut	X	X	X	Usually not	a, b, c, d, e	Instrumentation Seminar & Mycology workshop, discussion of curriculum and school policies.	0	X	X	sponsored workshops and seminars	Annual joint meeting recruitment	Liaison Committee	a, b, d, (symposium) Programs for college students, 9b. worked on unification of schools, questionnaires, acceptance dates, check-off lists, etc.
Delaware	0	X	X	X	a	.....	0	0	0	.....	Scholarship Fund	.....	c
D. C.	X	0	0	0	e	Teaching methods	0	X	0	.....	Annual joint meeting—judging at science fairs	DCMT Annual Seminar	.....
Florida	X	0	X	X	c	Curriculum, teaching methods.	0	X	0	.....	Instrumentation workshop	Standardization of training thru discussion.	c, b., 7. Education committee, 11. panel discussion at joint meetings 10. scholarship & joint meetings.
Georgia	0	0	–	School Directors meet during state	.....	.....	0	0	0	workshops	student awards	.....	c, d, college programs

Georgia	0	0	–	School Directors meet during state meeting to discuss recruitment and affiliations.			0	0	0	workshops	student awards		c, d, college programs
Hawaii	0	0	0	0			0	0	0		Salary scale investigations.	career conferences, Cancer Society activities.	b (Pathologist Society only recently organized).
Idaho	0	0	0	0			0	0	0		Path. help defray expenses of State Meetings.	Career: Medical Technologist.	
Illinois	X	0	X	X	c, e	Teaching methods, raising standards & status, recruitment of students.	0	0	0		joint meetings & workshops	local meetings & 4 state sponsored.	left to individual schools—6. Raising standards & status, recruitment of students
Indiana	0	0	0	0			0	0	0		Annual joint meeting & BB Seminar.	workshops, scientific meetings.	b, c,—10. Scholarships, Joint recruitment
Iowa	0	0	–	–			0	0	0		Med. Tech. School Foundation (Scholarship).	career day programs annual spring meeting & banquet.	a b, collaboration with colleges c, d.
Kansas	0	0	0	0			0	0	0	none yet	joint meetings liaison.	Local programs on EKG, blood groups, etc.	b, c, a, Midwest Hospital Assn. (College Affiliation Committee).
Kentucky	0	0	0	0			–	0	0			KSSMT Recruitment.	b, c.
Louisiana	0	0	0	0			0	0	0		Seminars, liaison meetings, annual seminar of M. T.'s.	Publicizing new program for M.T. at university.	b, c, d, 12d. Med. Tech. Counselors or instructors for colleges.
Maine	0	0	0	0			0	0	0		annual seminars	annual seminars	
Maryland	0	0	–	–			0	0	0		Joint Ed. Comm.	Joint Ed. Comm. & scientific programs.	c, Joint Ed. Comm. helps with recruitment, checks on available scholarships, sponsors workshops & seminar.

* Alaska has no AMA-Approved School. University of Alaska gives degree in M. T. but 4th year is at St. Lukes, Spokane.
** Colorado—question 1 projected for November 1961.

Tabulation of Alabama Project Questionnaire, May 1960—(Continued)

State	q. 1	q. 2	q. 3	q. 4	q. 5	q. 6	q. 7	q. 8	q. 9	q. 9. b.	q. 10	q. 11	q. 12 Additional Information
Massachusetts	0	0	0	0	.....	.....	–	–	–	.....	Liaison Committee Awards.	Workshops, legislation.	a, 11, Legislation-Approving Authority (State) for School of M. T.
Michigan	X	X	X	X	a, d, e	Student evaluation & examinations.	0	X	0	.....	Liaison Comm. Joint Meetings	Lecturing to H. S. Students	b, a, c, d, Liaison Committee sponsored meeting of Paths, T. S, supervisors of college program, over 100 attended.
Minnesota*	–	–	–	.....	.....	.....	–	–	–	.....	.....	.....	.....
Mississippi	0	0	0	.....	.....	.....	0	0	0	.....	Participation of Paths. in programs & seminars of MT's.	Development of a strong program at the U. Med. Center.	b, c, d—visits of Teaching Supervisors to college campuses, state seminar in Oct. is planned.
Missouri	0	0	0	0	.....	.....	0	0	0	.....	joint workshops	.....	.....
Montana	0	X	X	X	a	no prepared program.	0	0	0	.....	attempts to correlate reported values & standards.	college cooperation in seminars, workshops & attendance.	a, b, c.
Nebraska	0	0	–	–	.....	.....	0	0	0	.....	Assoc. of Path & Techs. help with annual post grad course sponsored by Nebraska.	Seminars.	c
Nevada***													
New Hampshire	0	0	–	–	.....	.....	0	0	0	.....	liaison in recruitment & scholarships.	closer liaison with colleges	a, c, 10. Joint meetings.
New Jersey	X	X	0	not usually	a, b, d, e	Seminars, discusses differences between programs in hospital schools	0	Not state wide	0	.....	Recruitment Scholarships.	seminars, post-grad. workshops.	c, d, 10. Annual seminars, inter-society liaison, 12d. meeting of faculty on campus and hospitals—H. S. volunteer lab aids.
New Mexico	0	0	0	0	.....	.....	0	0	0	.....	Science Fair prizes.	"coke" parties for H. S.	c, d—Recruitment chairman SMT

***No Return

New Mexico	0	0	0	0	.....	.....	0	0	0	.....	Science Fair prizes.	"coke" parties for H. S. students during Hospital Week.	c, d—Recruitment chairman SMT work with U. of N. Mex. to persuade to begin a 3 year program.
New York	X	0	X	X	a, d	college affiliations & preparation.	0	0	0	.....	Liaison Committee working on civil service changes, scholarships college affiliations.	Liaison Committee includes rep. from P. H. Lab. Path. & Med. Tech.	
North Carolina	X	0	0	X	a, b	exploration of need	0	0	0	.....	Joint recruitment & P. R. activities.	Seminar—M.T. recruitment	a, c,
North Dakota	0	0	0	0	.....	.....	0	0	0	.....	none	Work of Recruitment & P. R. Comm. SMT.	c, 11 workshops in BB. 12d. work being done toward degree program in local college.
Ohio	X	X	0	0	a, d, e	discussion of college affiliations, examinations, evaluations	0	X	0	.....	Joint Liaison & Recruitment Comm. developing.	increased interest in the teaching role of the line Medical Technologist.	
Oklahoma	X	0	0	0	a	Orientation, curriculum, schedules	0	0	0	.....	Recruitment	Scholarship	a sometimes, b, c, d—local paths. serve as guest speakers on univ. campus.
Oregon	X	0	0	X	a, c	Curriculum recommendations.	0	0	0	.....	salary survey, legislation	career days, films	b, c
Pennsylvania	X	0	0	X	a	discussion of need for meeting, what is being done in other states, and Teaching Supervisors Program at Temple Univ.	0	0	0	.....	Workshops	Teaching programs Temple & Univ. of Penn.	a-rarely, c.
Puerto Rico*													
Rhode Island	0	0	–	–	.....	.....	0	0	0	.....	Recruitment Joint Meetings	.....	courses set up in State Univ, 3 plus 1
South Carolina	0	0	0	0	.....	.....	0	0	0	.....	none	personal contract	.....

* Minnesota—No Return.
* Puerto Rico—No Return.

Tabulation of Alabama Project Questionnaire, May 1960—(Continued)

State	q. 1	q. 2	q. 3	q. 4	q. 5	q. 6	q. 7	q. 8	q. 9	q. 9. b.	q. 10	q. 11	q. 12 Additional Information
South Dakota....	X	X	X	X	a, b, c, d, e	curriculum, who does the teaching? Workshops, BB, and instruments.	0	0 in '58	0	.....	Scholarships, Joint meetings	recruitment activities.	c, a, 10. joint meeting relative to curriculum, 3 yr. requirements.
Tennessee.....	X	0	0	X	c	Teaching methods & materials, quizzes, organization and planning of courses.	0	0	0	.....	Path. financed speaker for M. T. meeting.	.....	c,
Texas.....	X	X	X	X	c	.....	0	X	X	.....	joint meetings	orientation—H. S. students degree program U. of Texas	b, c,
Utah.....	0	X	X	X	a	1. Recruitment, 2. Improving pay scale for M. T.'s	0	0	0	.....	cooperative teaching	University programs	c, d.—films. 10. Have attempted to improve and unify pay scale, 11. combined path lecture series.
Vermont**.....													
Virginia.....	0	0	0	.....	.....	First T. S. meeting planned for Fall Meeting	0	0	0	.....	joint meetings	working with Va. Council on Health & Medical Care scholarship fund.	c
Washington.....	X	0	0	X	a, c, e	Curriculum, teaching methods, student selection, rotation.	0	0	0	.....	liaison committee for schools	T. S. meeting, liaison comm.	a, b, c, d—"Uncle and Aunt" program for Junior H. S. Students.
West Virginia....	X	0	X	X	a, c, e	Orientation, Role of Teaching Supervisor, evaluation sheets, rotation schedules, student selection, recruitment, relationship with colleges.	0	0	0	.....	Essay contest, training Med. Tech. Lab. Assts.	State meetings, Education programs, recruitment	b, c, d,
Wisconsin.....	X	X	X	X	a, c	Organizational meetings.	0	0	0	.....	joint meetings.	career day, recruitment, development of new schools, representation on Community Welfare Council.	b, c,
Wyoming.....	0	0	0	0	.....	.....	0	0	0	.....	.....	Science fairs, career days	b, c, (This state has only one AMA-approved school)

role of the technologist; and development of strong teaching programs in the state medical centers. Much has been accomplished at the state level by medical technologists and pathologists working together. We believe that our questionnaire has stimulated some interest in state programs. Questions have come back to us, "If we had such a program, what would be the stated purpose and agenda?" If you are interested in beginning such activity, we shall be glad to send you suggestions from material we have gathered.

There are many ways to strengthen Medical Technology Education to meet the needs of the clinical and research laboratories of today and tomorrow. We who are responsible for preparing young people to take their places in these laboratories, Directors, Supervisors and Instructors, need to meet together, evaluate our programs, and take steps necessary for improvement.

We must challenge interested technologists to become teachers. Let us help them by planning seminars and workshops through which they can acquire or improve teaching skills. Only through the efforts of a strong corps of teaching technologists can we provide the skilled professional workers needed in clinical and research laboratories.

1. Have you had in your state meetings of Teaching Supervisors? _____
2. Have you had in your state meetings of Directors of Approved Schools? _____
3. Are such meetings being held at regular intervals? _____
4. Are they held in conjunction with other meetings? _____
5. What form do these meetings take? (check one or more applicable to your situation)
   a. Discussion of problems by individuals
   b. Workshops
   c. Panel Discussions
   d. Seminar
   e. Guest speakers
   f. Other (please specify)
6. What topics have you used in preparing programs for these meetings? _____
7. Do you have a Teaching Supervisors Committee provided in the Bylaws of your State Medical Technology Society? _____
8. Have you had in your state joint meetings of Directors and Teaching Supervisors? _____
9. a. Do you have in your state a Joint Committee of Directors and Teaching Supervisors? _____
   b. What activities have been undertaken by this committee? _____
10. What other joint activities have been undertaken in your state by Pathologists and Medical Technologists? _____
11. What local activity has contributed most to the improvement of medical technology education in your state? _____
12. Has liaison between hospital schools and campuses been developed through: a) Inclusion of college teachers in conferences _____; b) Medical Technology Clubs on Campus _____; c) Field trips for students to visit laboratories _____; d) Other _____
    Use reverse side for additional information.

_____

PHYSICIANS' OFFICE ASSISTANTS TRAINING PROGRAM*

SARA G. RICHMOND, B.S., MT (ASCP)

Dept. of Pathology and Microbiology, University of Tennessee Medical Units, Memphis, Tennessee

Introduction

In July, 1955, the Institute of Pathology, of the University of Tennessee in Memphis, initiated a new program entitled Physicians' Office Assistants Training Course. There were several reasons for the inauguration of this course. Due to the fact that Memphis is a large medical center, there is a vast number of physicians who need office assistants, but in most cases their need is not one which would warrant employing an A.S.C.P. registered medical technologist. It should be noted that a registered medical technologist is a highly trained individual who is qualified to perform laboratory procedures of an intensely specialized nature. The laboratory work carried out in the physician's office, for the most part, would not necessitate employing a person with such extensive training, nor would the medical technologist be particularly challenged or interested in this type of position.

With the field of laboratory medicine progressing at such a rapid pace, the acute shortage of trained personnel, and the expressed needs of the local Medical Society, it became evident that it was the responsibility of the University to train individuals at a lower level than that of the medical technologist to help provide better patient care.

It was also the feeling that there were enough high school graduates, unable to obtain a college education, to justify setting up a program which would provide training in the laboratory field on a limited basis. By incorporating this program into their curriculum, the University of Tennessee felt that the student would be more adequately trained to perform certain basic laboratory routines than if this task were left to the busy physician himself. Consequently, the Physicians' Office Assistants program was begun on an experimental basis at the University of Tennessee in the Institute of Pathology, with the major objective being to equip individuals to fulfill the needs of the physician's office.

Planning the Course

When the Physicians' Office Assistants program was announced, the exact number of students that should be admitted into the class had not been determined, nor had a definite curriculum been set. It had, however, been decided that the length of the course would be 2 quarters and that it would be taught by an A.S.C.P. registered medical technologist with a Baccalaureate Degree, with this teaching to be full-time position. This we felt to be the wisest plan, in that a registered medical technologist would be acquainted with those particular laboratory routines which are confined to a physician's office; would be able to keep the students aware of the limitations of the training;

* Received for publication Dec. 1960.

and would be able to determine adequately the scope and character of the program.

We, of course, had no way of knowing what the response to offering such a program would be, and tentatively planned to consider any applicants who were interested. As a result of an advertisement in the local newspaper, we had ten inquiries and accepted all ten as students in the first class. Our fundamental requirement was a high school education with a relatively good record throughout the four years, both as far as scholastic achievement and character development were concerned.

In that the course was set to run for 6 months, the material to be covered was extensive, and since prospective students would have no background courses, it was felt that the hours should be relatively long. Therefore, it was decided that for the first quarter the students would attend classes from 9-5 Monday, Wednesday, and Friday, and 9-1 Tuesday and Thursday. These would be formal classes including lecture and laboratory. The second quarter was set at a forty hour week on the rotation plan where the students would spend a certain amount of time in the various clinics associated with the University working under supervision of registered medical technologists and gaining practical experience. We felt that this program should be kept entirely separate from the Medical Technology Degree program. So, plans were made for these students to rotate through departments other than those through which the medical technology students rotate.

Registration and Fees

The Physicians' Office Assistants students accepted into this first class were instructed to register in the University on general registration days and to follow the same procedure as all new students entering the Medical Units. A physical examination and various immunizations were required prior to registration. The fees for the course were set as follows:

Tuition 1st quarter	$124.00
Tuition 2nd quarter	54.00
Contingent deposit, initial registration	15.00
Microscope rental fee, quarterly	15.45
Books and supplies, approximately	25.00

Registration policies and fees have remained the same since the initiation of the program.

Books

The suggested books to be purchased by members of the class were: *Physicians' Office Attendants Manual* by Henry B. Gotten, M.D. and Douglas H. Sprunt, M.D.; *Laboratory Procedures,* City of Memphis Hospitals by L. W. Diggs, M.D.; and *Hematology for Medical Technologists* by Charles Seiverd. Such books as *Approved Laboratory Technique* by Kolmer were made available by the Pathology Department for those students interested and capable of comprehending the material. The above mentioned books were selected because of their suitability for students in this type of training program. Any additional material, including mathematics, was supplemented through lectures.

Since we in the University had no experience with this sort of training, it was impossible to construct a definite lecture schedule. However, points that we thought necessary to cover, and areas that would definitely be omitted were decided upon. It was decided that no chemical determination on the blood, no bacteriological procedures, and very definitely no blood bank procedures would be covered. It was to be explained carefully to the students why they shouldn't attempt any blood typing or cross-matching with their limited training and the extreme dangers connected with attempting these procedures. So, with these thoughts in mind, the lecture schedule was constructed day by day, determined by the amount of material the students were able to assimilate adequately, our thinking being that the main objective was to teach these students a few procedures, but teach them thoroughly. By using the first class as an experiment, lecture and laboratory schedules were devised for the first quarter's work. After several revisions, the following schedules are currently used in the training program.

Lecture Schedule

1. Orientation
2. Purpose of Blood
3. Blood and Its Functions
4. Red Cell Count—White Cell Count
5. Use and Care of the Microscope
   Quiz

6. Metric System
7. Hemoglobin—Haden-Hausser
8. Hemoglobin—Sahli
9. Use and Care of Needles and Syringes
10. Venepuncture Technique
    Quiz

11. Finger Puncture Technique
12. Sedimentation Rates
13. Hematocrit
14. Mean Corpuscular Values
15. Solutions
    Quiz

16. Solutions—Per cent
17. Solutions—Molar
18. Solutions—Normal
19. Solution Problems
20. Review Lecture
    Quiz

21. Cleaning Slides and Cover Slips—Making Smears
22. Abnormal Hematology
23. Cells and Differential Counts
24. Cells and Differential Counts

25. Movies: "Career Medical Technologist," "The Human Cell," and "The Cyto-technologist"

26. Function of Blood Platelets
27. Platelet Counts—Technique
28. Function of Reticulocytes
29. Reticulocytes—Technique
30. Introduction—Urine
    Quiz

31. Urinalysis
32. Urinalysis
33. Urinalysis
34. Precautions—Handling Materials and Chemicals
35. Reading Assignment Reports
    Quiz

36. Drugs and their Application
37. Smears—Gram Stain; Acid-Fast Stain
38. Purpose of Bleeding and Clotting time
39. Hemorrhagic Diseases
40. Blood Types and Rh: Dangers of
    Quiz

41. Bleeding Time Technique
42. Clotting Time Technique
43. How to Prepare a Specimen for a Pathologist
44. Why Laboratory Tests Should be Checked
45. Quiz

46. Medical Ethics
47. Venereal Diseases and Tests For
48. Blood Cell Review—Lantern Slides
49. Preparation of Bacteriological Specimen
50. Quiz

51. Medical Ethics
52. Medical Ethics
53. Doctor—Patient—Assistant Relationship
54. Review Lecture
55. Check Out

56. Final Examination

Laboratory Schedule

Work to be turned in during Quarter
(Each test must be done in duplicate)

100 Red Cell Counts
100 White Cell Counts
100 Hemoglobins

50 Sedimentation Rates
50 Hematocrits
10 Mean Values
20 Platelet Counts (2 methods)
10 Reticulocyte Counts (2 methods)
50 Complete Urinalyses
10 Gram Stains
10 Acid-fast Stains

Each student will spend one morning per week in clinic doing venipunctures and one afternoon cleaning and sharpening needles and sterilizing.

Each student will be instructed in the operation of the balance, and preparation of solutions used during quarter.

Each student must turn in a report of all tests covered during quarter, on his own blood.

Students, besides checking their own results, must check each other. (Sample of checks—Table I)

A Red Cross First Aid Class will be offered by one of the instructors from the American Red Cross—5 hours lecture; 5 hours practical.

The students are required to pass weekly quizzes, and to become adept in the practical work. They are required to pass a final examination before being promoted to the second quarter.

Rotation Schedule

During the second quarter the Physicians' Office Assistants students are rotated through the following clinics:

General Practice Clinic	2 weeks
Cancer Clinic	2 weeks
Venereal Disease Clinic	2 weeks
Admission Laboratory	2 weeks
Cancer Smear Clinic	1½ weeks
Pathology Office	1 week

While the students are in the above clinics they work under supervision gaining practical experience. A weekly check is made by the instructor of the course with the supervisors of the various areas and the students. The students are graded in each area by evaluation sheets (Table II) which are submitted to the coordinator of the course to be filed with their permanent records. During the last three days of the quarter, the class is called back together. Each student gives an oral report on reading assignments; there are more lectures on ethics

and conduct expected as employees in the physician's office; and a review session is held. At the end of the quarter, students are required to pass a final examination that is given during the regular examination period for all University of Tennessee students.

TABLE I

Blood Bank Blood Divided and Numbered as 20 Separate Samples of Blood: Results Obtained by Students in First Physicians' Office Assistants Class

4th WEEK TRAINING				7th WEEK TRAINING			
RBC	WBC	HBG.	HCT.	RBC	WBC	HBG.	HCT.
3.90 4.02	6,900 6,650	12.0	38%	3.30 3.31	2,550 2,550	8.0	29%
4.25 4.21	6,400 6,350	13.0	38%	3.01 3.12	2,850 2,800	8.0	29%
4.00 3.88	8,000 7,300	13.0	38%	3.51 3.52	4,500 4,600	8.0	29%
3.89 3.09	9,450 9,300	13.0	39%	3.07 3.04	2,350 2,500	8.0	29%
3.95 3.86	7,550 8,600	13.0	....	3.12 3.19	2,500 2,250	8.5	29%
4.39 4.41	....	...	39%	3.00 3.18	2,450 2,900	8.0	29%
4.24 4.30	10,200 9,400	13.0	....	3.19 3.07	2,100 2,000	8.5	29%
3.89 3.48	6,500 7,100	13.0	39%	3.04 3.08	2,300 3,200	9.0	29%
4.65 4.86	10,050 10,450	13.0	....	2.75 2.50	2,650 2,550	9.0	29%
3.95 4.08	5,350 6,100	13.0	38%	3.30 3.36	3,600 3,200	8.0	29%
4.04 4.53	6,800 5,900	12.5	....	2.97 3.05	2,400 2,300	8.0	29%
4.01 4.04	....	...	....	3.35 3.40	2,350 2,800	8.0	29%
4.09 4.26	8,200 8,500	12.0	39%	3.43 2.73	2,400 2,500	8.5	29%
3.66 3.64	7,950 7,300	...	38%	3.22 3.27	2,600 2,500	8.0	29%
3.87 3.93	6,150 6,400	11.5	39%	3.12 3.19	2,500 2,250	8.5	29%
3.80 3.89	6,950 7,100	11.5	....	3.36 3.56	2,700 3,100	8.5	29%
3.75 3.79	5,700 5,500	12.0	38%	3.10 3.34	2,950 3,050	8.0	29%
4.23 4.35	7,900 7,300	13.0	....	3.71 3.91	2,900 2,500	8.0	29%
3.86 3.72	....	...	38%	3.06 3.48	2,650 2,250	8.0	30%
3.83 3.64	6,500 6,600	12.5	....	3.28 2.95	2,600 2,600	8.5	29%

TABLE II

PHYSICIANS' OFFICE ASSISTANTS
STUDENT RATING SHEET

NAME_____
LABORATORY_____
DATES_____

CHECK (X) THE POINT WHICH BEST EVALUATES THE STUDENT.

ASSUMES RESPONSIBILITY
_____Assumes responsibility readily
_____Assumes responsibility occasionally
_____*Will not* assume responsibility

ACCURACY
_____Work is accurate and reliable
_____work is reliable most of the time
_____Work is unreliable

NEATNESS ON WORK
_____Always neat with work
_____Neat most of the time
_____Seldom neat
_____Does sloppy work

INDUSTRY
_____Consistently industrious
_____Occasionally seeks additional work
_____Needs prodding
_____Does least amount of work possible

PERSONAL APPEARANCE
_____Very neat at all times
_____Neat most of the time
_____Untidy and careless about appearance

PERSONALITY AND DISPOSITION
_____Pleasant and steady
_____Occasionally unpleasant
_____Moody and unpleasant

INTEREST
_____Very interested in work
_____Indifferent
_____Disinterested attitude

RELATIONSHIP WITH STAFF
_____Good relationship
_____Not always cooperative
_____Poor relationship

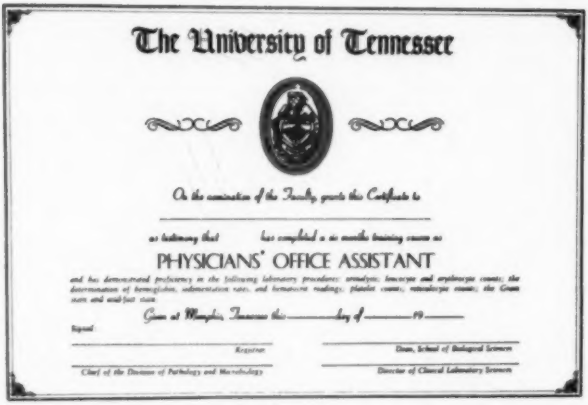
RELATIONSHIP WITH PATIENTS
_____Considerate, patient, inspires confidence
_____Ill at ease with patients
_____Inconsiderate, fails to inspire confidence

Signature_____ Date_____

On satisfactory completion of the two quarters' work, the Physicians' Office Assistants students are awarded a certificate of proficiency (Fig. #1). This certificate is presented at a special exercise that is held solely for these students.

Resumé of the Course

Since the initial class was admitted in July, 1955, there has been no formal advertisement of this program. There is now an official application blank which must be submitted along with a high school transcript before acceptance is considered. At the present, the course is offered twice a year with classes being admitted during the winter and summer quarters. Twelve students are accepted for each class, these being selected from approximately twenty to thirty-five applications that are submitted. A descriptive brochure has been prepared on the course, and this is mailed to all interested individuals on request. There is now an official pin (Fig. 2) that all graduates of the course have the privilege of purchasing.



The University of Tennessee

On the recommendation of the Faculty, grants this Certificate to

_____

as testimony that _____ has completed a six months training course as

PHYSICIANS' OFFICE ASSISTANT

and has demonstrated proficiency in the following laboratory procedures: urinalysis; leucocyte and erythrocyte counts; the determination of hemoglobin, sedimentation rates, and hematocrit readings; platelet counts; reticulocyte counts; the Gram stain and acid-fast stain.

Given at Memphis, Tennessee this _____ day of _____ 19____

Signed:

_____ Registrar

_____ Dean, School of Biological Sciences

_____ Chief of the Division of Pathology and Microbiology

_____ Director of Clinical Laboratory Sciences

Figure 1

Figure 2

The numbers of students entering and finishing, geographical locations and age ranges for the five-year period of this course are listed in Tables III, IV and V.

TABLE III
Summary of Students Entering and Finishing Physicians' Office Assistants Program

	Started	Finished
July, 1955	10	10
January, 1956	6	6
July, 1956	10	9
January, 1957	10	9
July, 1957	10	10
January, 1958	6	6
July, 1958	11	11
January, 1959	12	12
July, 1959	12	9
January, 1960	12	10
TOTAL	99	92
PERCENTAGE:		92.9

TABLE IV
Residence of Graduates

Memphis Residents	55	59.8%
Tennessee	21	
Mississippi	7	
Arkansas	3	
Alabama	1	40.2%
North Carolina	1	
Virginia	1	
Missouri	3	

TABLE V
Age Range of Graduates

Age 17–20	65	70.7%
Age 21–25	9	9.8%
Age 26–30	4	4.3%
Age 31–40	7	7.6%
Age 40 +	7	7.6%

In April, 1959 the University of Tennessee decided to place several of the para-medical courses into one category. Thus, was established in the Department of Pathology and Microbiology the Section of Clinical Laboratory Sciences. The courses included in this section are: Degree program in Medical Technology; Cyto-technology; Histological Technique; Certificate in Microbiology and Physicians' Office Assistants. All

applications, transcripts, records, interviews, correspondence and other administrative procedures pertinent to these courses are handled by the director of the section.

Evaluation of the Program

In July, 1960, having reached the five-year period since the initiation of the Physician's Office Assistants program, it was felt that at this time, it would be beneficial to attempt an evaluation. We wished to determine a number of things: the value of this type of training to the Medical Profession; if there still existed a need for individuals with this type of training; and whether extending the time and broadening the scope of the program would be valuable. A questionnaire was compiled to provide this information, and was mailed to the ninety-two individuals who completed the course during the five-year period.

Of the ninety-two questionnaires mailed out, 69 (75.0%) were returned. Of these 69 returned 66 (95.7%) indicated that they were employed or had been employed, using knowledge gained during their training.

The figures in Table VI present the locale of the 66 Physicians' Office Assistants who indicated employment, and the figures in Table VII indicate the types of employment.

TABLE VI
Employment Locale of 66 Graduates

	Number	Percent
Memphis	46	69.7
Other Areas in Tennessee	5	7.6
Florida	4	6.1
Arkansas	4	6.1
Alabama	2	3.0
Mississippi	2	3.0
Georgia	1	1.5
Illionis	1	1.5
Montana	1	1.5

TABLE VII
Types of Employment 66 Graduates

	Number	Percent
Physician's Office	39	59.1
Clinic (More than 1 Physician)	11	16.7
*Hospital	16	24.2
*9 Were newly created positions	..	....

Of the 66 graduates indicating employment, there were 22 that were not working in the field at the time the questionnaires were sent out. The reasons for their unemployment are presented in Table VIII.

TABLE VIII

22 Physicians' Office Assistants Unemployed

*Married.....Pregnancy	15
**Entered College	4
Illness	1
Leaving the Country	1
Better Salary in another Field	1

* Includes 1 never employed.
** Includes 2 never employed.

Other information obtained from the questionnaires indicated that about fifty per cent of the graduates felt that both the time element and course content were adequate for the type of position that they held. It was interesting to note that several stated that it would be helpful to the graduate to have more knowledge of laboratory procedures, but if one wanted more, he should attend Medical Technology school.

Of the remaining fifty per cent, most felt that X-ray should be included in the course, which would not be at all feasible as the University of Tennessee conducts an X-ray Technologist course of two years duration. There were scattered suggestions that various blood chemistries, prothrombins, EKG's, and assisting at minor surgery be included.

Conclusion

In reviewing the five years that the Physicians' Office Assistants program has been in operation, it appears that it has proved very useful to the medical profession. The graduates of the program have filled a gap that has long existed, especially in this area. The practicing physicians have become acquainted with this lesser type training and know if their particular need calls for an individual with such training. The constant demand for the graduates speaks for itself in the continuation of the program. However, in a program such as this, the students should be carefully selected and the training strictly controlled by competent individuals who are aware of the dangers of such training. We cannot say for sure that this particular program is the complete answer, but there certainly exists critical need for individuals trained in laboratory procedures at a lower level than that of the ASCP Registered Medical Technologists, and we feel that it is the responsibility of the Pathologists and Medical Technologists, particularly those associated with medical schools, to consider seriously this type of training.

Summary

An account of the initiation and development of a new type of training program entitled Physicians' Office Assistants is given in this report. Included are purposes for establishment, fees, course content, practical training and employment opportunities. An attempt is made to point out the need in the medical profession for laboratory personnel trained on a lesser level than that of the ASCP Registered Medical Technologist.

THE ROLE OF THE ADMINISTRATOR IN THE GROWTH & DEVELOPMENT OF THE LABORATORY*

MARTIN S. ULAN
Administrator, Hackensack Hospital, Hackensack, New Jersey

An invitation to discuss pathologist, medical technologist, laboratory-hospital relationships is a provocative challenge because of the inherent opportunity to introduce controversial opinions in an area of hospital operation currently in the limelight. It would be unfair, unethical and improper to treat with levity a relationship as serious and important as the one on this program.

In explanation and partially as an excuse of this paper, it must be recognized that the opinions, observations and comments expressed reflect herein a limited experience obtained from an intimate working relationship with only two pathologists, two assistant pathologists, and two chief medical technologists. This paper, therefore, is a report of an experience that has proven successful, fruitful and enjoyable to those of us who work at Hackensack Hospital.

The pathologist must be many things to many people. He is a physician, chief of a medical service and a member of the medical staff in addition to being on the paid staff of the hospital. As a member of the paid hospital staff, the pathologist is a department head, a teacher of physicians, nurses, laboratory personnel and other employees. As a pathologist, he is an advisor and auditor of the medical staff. He acts as an interpreter to the administrator of medical staff attitudes and he can be a most important and invaluable bridge of understanding between the hospital and the medical staff.

In order to insure that the hosiptal community derives the maximum benefit from the pathologist, the administrator must set an example and establish the pathologist in his proper setting.

Role of the Administrator

Although the pathologist may be listed as a department head on many organization charts, it would not be in the best interest of the hospital to enforce the same relationship and control on the pathologist that exists between administration and most other department heads. Time does not permit listing and explaining all the exceptions which are made at Hackensack. There are some exceptions, however, so important to a successful relationship that they *must* be listed and explained. These exception are really delegated extensions of the authority granted to the administrator by the governing board of the hospital.

The first area in which an exception is made is in the transmission of information, financial, statistical and policy data. A well informed pathologist can function as a better physician and department head. All records pertaining to the financial operation of the laboratory should be open to inspection and discussed freely with the pathologist. Requisitions for capital purchases, expenses for special projects and the authority to

* Conference of Supervising and Administrative Medical Technologists—Read before the 28th Annual Convention of ASMT, Atlantic City, New Jersey, June 1960.

spend a previously agreed upon sum of money without seeking the approval for each requisition is an example of delegation in accordance with the educational status and intellectual level of the pathologist.

The pathologist should have similar freedom in determining charging schedules, salary scales and working conditions. These should be delegated to the pathologist. In a good working relationship implementation is preceded by a conference with the administrator because information must flow in both directions. Any intelligent person will make an intelligent and correct decision if all the facts are made known. Frequency of incorrect decisions out of order with the hospital policy can be directly related to a lack of sufficient information on which to base the decision.

Semi-annual audits of the departmental operations can be conducted by the administrator with the pathologist and chief technologist present. At the semi-annual audits all decisions are reviewed, salary and charging scales are discussed and implemented. The laboratory operation can be compared with the budgeted and planned program which was developed at the beginning of the year. The audit makes it possible for the administrator to conduct, along with the pathologist, a semi-annual review to make certain that every aspect of the laboratory operation is in accordance with the previously agreed program.

An administrator who treats the pathologist as a mere employee and not as a top ranking member of the medical staff and part-time department head is developing an environment and an example which will be followed by all other employees and the medical staff. An administrator has the responsibility of providing an environment where the pathologist can enjoy the full status of a chief of a medical service and a department head of unusual status. In the daily operations of the laboratory it is wise to have the chief technologist transact most of the business with the other department heads, attend department head meetings and assume the complete responsibility of a chief executive officer. It is the responsibility of the pathologist and the administrator to assure the success of the chief technologist in this role. The pathologist then has the time necessary to transact professional matters with members of the medical staff and administrator. This helps to develop a laboratory which can achieve its full potential.

The pathologist has a responsibility to the hospital to spend his hospital time performing professional duties for the patients and he should give his chief medical technologist the same freedom and delegation of authority which he receives from the administrator. The pathologist must devote considerable time to teaching the medical staff to properly utilize the laboratory services. Such time can result in monetary savings to the hospital and the patient far in excess of any monetary savings that result from petty efforts at raising fee schedules or keeping salaries at a low level. If the pathologist is to be effective in his work with the medical staff he must have economic as well as professional status. To accomplish economic status, the income of the pathologist must be comparable to that of the chiefs of clinical services of equal professional training. To achieve professional status the pathologist must be accorded the same rank as the chiefs of clinical services, and the relationship be-

tween the pathologist and any one chief of a clinical service must be the same as that which exists between individual chiefs of clinical services.

The pathologist must be provided with an opportunity to conduct a limited private practice. This is one of the most important status symbols, not to the pathologist but to the members of the medical staff who tend to look upon the private practice of medicine as the highest form of professional status. This can be accomplished by permitting private billing for a number of procedures in which the work or the decisions are largely those of the pathologist and where the laboratory personnel perform only a small role.

Considerable amount of time has been devoted to discussing the status of the pathologist and little to the role of the chief technologist. This is so because the status of the chief technologist is directly related to that of the pathologist. Some delicate situations must be carefully maintained between the pathologist, administrator and chief technologist. The chief technologist should feel free to talk to the administrator, members of the medical staff or laboratory personnel about any subject without fear of vengeful, or any emotional reactions from the pathologist and without fear of hasty or untoward action on the part of the administrator. When the chief technologist is guilty of errors in judgment, all parties should review the problem and consider the factors which resulted in the difference of opinion or error in judgment. In summary, it can be stated that harmony, and a pleasant working relationship depend upon (1) mutual trust and respect; (2) free exchange of financial, statistical policy and professional information; (3) willingness to discuss and arbitrate until mutual agreement is reached on any and all problems; (4) the development of adequate status symbols to insure that the medical community recognizes the pathologist as a physician, first, and a member of the hospital staff, second; (5) the relationship should be free of avarice, greed, competition and debilitating symptom; such as, gossip about one member of the team by any of the other members.

LABORATORY ADMINISTRATION*

The Role of the Pathologist

DONALD E. BROWN, M.D.

Director of Laboratories, Hackensack Hospital, Hackensack, New Jersey
Assistant Professor of Pathology, Columbia University, College of Physicians & Surgeons

You have just learned from Mr. Ulan how the administration of at least one hospital regards its pathologist and his department. The administrator speaks for the Board of Governors which is ethically and legally responsible for the total care of the patient in the hospital, and the development and operation of the laboratory is perforce extremely dependent upon its attitude. If it is inimical to one's own philosophy, he is defeated from the outset. If it is vacillating, he is doomed to an administration of short term expediency rather than long term progress. Only if there is candidly expressed agreement in major areas will there be an adequate basis for the development of a successful department. If such is not the case, one may attempt to change the attitude of the Board of Governors, accept it, or get out. In far too many instances there exists neither the ability to change it nor the courage to get out. It is small wonder that such departments are neither happy or successful.

In order to evaluate adequately the attitude of hospital administration, the laboratory staff must crystalize its own administrative thinking. The first step is the development of a philosophy concerning the goals to be reached and the methods by which they are to be achieved. It should be recognized that a hospital clinical laboratory must provide service, teaching and research in that order and each function must be carefully considered with respect to comparative importance. In addition, the desired level of proficiency should be set for each of these three areas. The next step is the formulation of policy in conformance with established philosophy. For the most part policy is very similar to legal precedent in that it represents the application of relatively broad concepts to more or less specific situations. It provides a stable set of operational rules. If any given policy proves unwise, it may be altered as long as there is no conflict with the parent philosophy. The third and final step is implementation of policy. This involves decisions on the myriad of minutiae which plague all of us day in and day out. If properly decided in the light of existing policy, the daily operation of the department will develop as a cohesive and comprehensive pattern. If not, there can ensue only a welter of confusion with complete decay of the administrative structure. It is frequently thought by those unfamiliar with administration that policy produces restrictive barriers which impede implementation. On the contrary, policy delineates both the area of responsibility and the direction of decision. It facilitates implementation so that the burden of making decisions is reduced to a minimum. Implementation may take many forms dependent upon the circumstances. Policy is based upon philosophy and formulated only after considerable reflection.

* Conference of Supervising and Administrative Medical Technologists—Read before the 28th Annual Convention of ASMT, Atlantic City, New Jersey, June 1960.

Philosophy is immutable. It can never be compromised without producing administrative dry-rot.

In order that the written operational plan have any functional reality, it is mandatory that the personnel involved accept full responsibility for carrying out their designated tasks. This responsibility is an integral part of the individual's position in the department and must be accepted on a 24 hour a day, 7 day a week, 52 week a year basis unless it is specifically transferred to another individual. The acceptance of responsibility constitutes the major difference between a trade and a profession. Failure of acceptance places one's professional status in serious jeopardy. It should be clearly understood that there is a difference between responsibility and accountability. An individual is responsible for all of his own actions and all those of his subordinates. He is accountable only for what he himself does. The extent to which responsibility exceeds accountability is a measure of executive status. It is also obvious that responsibility without commensurate authority is completely untenable. If any individual is expected to be completely responsible for his subordinates, he must have complete control over them, including hiring and firing.

The area of responsibility for any given individual is clearly delineated in the written job description for his position and the decisions which he makes are based upon those written policies which are applicable. Responsibility is so graded to produce a tight chain of command which is strictly followed. To do otherwise would undermine a subordinate or short circuit a superior, either of which is contrary to the concept of balanced authority and responsibility.

In the development of policy, the pathologist must always assume an equilibrium position among three forces: the hospital administration, the medical staff, and the laboratory personnel. The magnitude and direction of these forces acting upon established philosophy produces policy. Because the ultimate responsibility belongs to the Pathologist, the ultimate authority of decision is likewise his. This, of course, is quite proper, for he is the one individual best fitted by training and experience to make such decisions. Failure of the laboratory personnel to appreciate these facts often leads to misunderstanding, criticism and disunity. It is essential, therefore, that they be adequately informed. The Pathologist cannot isolate himself behind a paraffin curtain and expect to maintain liaison with his department. Neither will such an approach enable him to deal effectively with the hospital administration and the medical staff. The Chief of the Laboratory Service must assume a stature commensurate with other chiefs of service. This includes such things as the privilege of private practice, membership on the Medical Board and a comparable return for services rendered. The attitude of the rest of the hospital towards the Clinical Laboratory is in no small part a reflection of its attitude toward the Pathologist. If the Director of Laboratories cannot or will not command an appropriate regard for his own position, he will certainly be of no value in assisting his personnel along similar lines.

In order that the Pathologist be aware of the forces acting upon him and that others be aware of his position as regards such forces, channels

of communication must be established. While informal personal contact is absolutely essential, it alone has a great tendency to produce ad hoc decisions of questionable wisdom. For this reason, formal meetings have been established with the hospital administration, the medical staff and the laboratory personnel.

Once a week the laboratory administrative staff meets with the Administrator to discuss mutual problems. This same group meets twice a year for the semi-annual audit which covers personnel evaluation, recommended salary increases, changes in personnel classification, budget and long range planning. Once a year the Director of Laboratories meets with a committee of the Board of Governors to review philosophy, major policy changes and long range planning. At the end of each month the Administrator receives a written report covering the work of the laboratory and he sends a written comment back to the pathologist. The annual report is submitted by the pathologist to the Board of Governors at the annual meeting.

Communications with the medical staff as a whole operate in part through formal and informal consultation with individual physicians and in part through formal participation in the over-all Post Graduate Education Program. Communication with the Medical Board is direct, both the pathologist and assistant pathologist being members. The great bulk of policy decisions, however, are made in conjunction with the Laboratory Committee, which is a committee of the Medical Board. The Laboratory Committee is composed of one representative from each clinical service in the hospital, one of whom serves as chairman. The laboratory administrative staff acts in an advisory capacity and the chief technologist functions as recording secretary. The committee meets monthly to consider those administrative and technical problems of the laboratory which are related to the clinical practice of medicine. In addition to acting as a channel of communication and an advisory group, it constitutes a nidus of clinicians who are both interested in and informed about the laboratory. These men have been of inestimable help in making their colleagues aware of laboratory problems and policies. Perhaps their greatest contribution is to establish policies with respect to the ordering of procedures and to act as a buffer between the laboratory and those clinicians who tend to make unreasonable demands. In such instances we comply with the request of the ordering physician and then recommend that he formally present his grievance to the committee of his peers who established the policy. Not only does this greatly dampen his ardor, but it extricates the laboratory administrative staff from some very unpleasant situations.

The majority of communications within the Department of Laboratories are conducted on an informal basis. This must be carefully controlled, however, in order that the chain of command be followed and that there be no suggestion of favoritism. Because all personnel are well appraised of policy, it is seldom that such informal communications results in action at cross purposes. The clinical laboratories are divided into two groups, with the pathologist and chief technologist responsible for one group and the assistant pathologist and assistant chief technologist responsible for the other. This is a total responsibility and

includes personnel management, budget, audit, purchasing, teaching, quality control and long-range planning. The junior members of the administrative team are responsible to the senior members and, as previously discussed, the pathologist is responsible for the entire operation. Formal communication between the pathologists and the technologists with whom they work is conducted daily. With the junior members, this pertains only to those departments for which they are responsible. With the senior members, this is broadened to include any problems which may be brought to them by the junior members.

A formal weekly conference is held between the pathologist and chief technologist to consider, among other things, the relationships between the laboratory and other service departments. As previously discussed, the pathologist is regarded as Chief of Service. It is, therefore, inappropriate that he be considered a department head in the sense that the term is applied to such service departments as dietary, maintenance, purchasing, departments of nursing service, etc. with direct responsibility to the Administrator. This position is occupied by the chief technologist who thus assumes a status comparable to that of the chief dietician, operating room supervisor, pediatric nursing supervisor, etc. In this capacity she reports to the pathologist concerning problems at that level.

The work of the laboratory administrative team is greatly facilitated by accurate record keeping. There is posted on the bulletin board the weekly work load for each section and for the laboratory as a whole. Opposite this is listed the number of 40-hr. per week personnel, a figure arrived at by dividing the total weekly work hours of all personnel by 40 and listing the result as the number of personnel. This provides a constant tally for evaluating section and total work-load with respect to the number and distribution of personnel. These figures are incorporated into the monthly report sent to the administrator. Along with them, for comparative purposes, are sent the figures for the same period during the previous year. Each month we receive from the hospital accountant a complete statement of our fiscal operation for comparison with our budgetary allotments. A consideration of work-load and total personnel in the light of total income and expense, frequently demonstrates areas of inefficiency which would otherwise go unsuspected. In addition to weekly and monthly checks these statistics are absolutely essential for any intelligent budget planning.

Perhaps the greatest contribution to administrative stability is the written word. The development of policy is entirely too arduous for the results to be trusted to memory and word of mouth. They must be written in clear and concise language which will allow no ambiguity of interpretation. One of the deadliest sins of administration is to give diametrically opposed solutions to the same problem on two separate occasions. It is fatal to say "yes" to one person and "no" to another. This, however, is very easy to do if you either have no policy or cannot recall what the policy was the last time the problem arose. To this end we have compiled a 3-volume, looseleaf administrative manual which is sufficiently extensive for a complete stranger to walk into our department and take over with no disruption of continuity. We keep

careful notes of all conferences and careful minutes of all meetings. The chief and assistant chief technologists write down all problems to be discussed with their respective pathologists and they carry their little "head-ache" books with them at all times. We even log all incoming calls with respect to time, caller, message and disposition of call. It is surprising what a salutory effect this has on the veracity of all concerned. In addition to our operational policy manuals we have compiled a personnel policy manual, a copy of which is distributed to every member of the staff. This was felt desirable, for although the hospital as a whole has a personnel policy manual, a great number of policies pertaining only to the laboratory are not included.

One budgetary allocation which we feel to be of great importance is a sum of money listed as "extraordinary expenses." In essence, this is a discretionary fund to be used by the Director of Laboratories for any legitimate purpose except the subsidization of salaries. This includes such items as capital equipment, guest lecturers, convention and education expenses for key personnel, and books. The fund is administered by the Director of Laboratories acting on the advice of the administrative team and the requests from the section heads. Everyone involved knows exactly how much money is available and they are expected to evaluate their requests with this in mind. If, in the presence of insufficient funds, chemistry requests a new water bath and the clerical personnel request a new electric typewriter, it must be decided by the chiefs of the involved sections which is the more important and only one request submitted. In view of the fact that capital equipment takes precedence over convention and education expenses, interest in maintenance takes on added meaning. Perhaps the greatest value of this fund lies in its philosophical implication that the hospital administrator is willing to invest current laboratory income in future laboratory development and to entrust its administration to the laboratory personnel.

Annually there is held an evening meeting of the entire laboratory staff. It takes place in the board room of the hospital and includes all personnel from the assistant glassware washer to the Director of Laboratories. At that time the pathologist reviews with them the annual report of the laboratory which has previously been submitted to the Board of Governors at their annual meeting. Following this he discusses any new policies or changes in old ones. Finally, he reviews the departmental philosophy and discusses long-range plans for development in the light of it.

These meetings have always profoundly impressed me, for in the faces and attitudes of my personnel I can visualize the full fruition of our labors. I know that everyone in the room feels a deep sense of responsibility to the patient, to the department, to his colleagues, and above all, to himself. I know that because of this no one will resign in search of minor salary differentials. I know that because of this everyone is willing to give that little extra which is essential for a good department. I know that we have created a team and imbued it with a spirit, and there can be no more gratifying realization for any chief

LABORATORY ADMINISTRATION*

The Role of the Chief Technologist

CORNELIA VAN BENTHEM, B.A., MT (ASCP)
Chief Technologist, Hackensack Hospital, New Jersey

In our hospital the chief technologist functions as a department head and has department head status. In this capacity, therefore, she works with:

1. other departments
2. with hospital administration
3. with the laboratory directly

Her work with other departments is of primary importance for here she can explain the functions and proper use of the laboratory. Attendance at department head meetings, head nurses meetings, meetings with the faculty of the nursing school, and with the department of hospital sanitation all help to make the laboratory an integral part of the hospital team. Her work with regard to hospital administration has been covered by Dr. Brown and Mr. Ulan. Her work with respect to her own department, however, is the area which most truly reflects her professional philosophy.

The working relations between the chief technologist and the Director of Laboratories is of extreme importance and often sets the tenor of the laboratory. These members of the laboratory management team act as counselor, teacher, listener, and trouble-shooter. Very often the chief technologist and pathologist may act in this capacity for one another as well as for their staff, for the job of administration can be a lonely one.

The most important function of the chief technologist is to plan for present and future operations through participation in the creation and implementation of policy. Policy is based on philosophy and objectives and is the foundation of good administration. Failure to understand this leads to inadequate utilization of physical facilities, inadequate organization of personnel and inability to recognize the defects. If philosophy, objectives, and policy are to fully serve their purpose, and keep one from floundering around, they must be written and revised when necessary. Administrative manuals have been proved in our situation to be very helpful. The administrative manuals of the Hackensack Hospital laboratory reflect a five year plan developed to completely reorganize the laboratory; a plan based on philosophy, objectives and policy. This plan may be illustrated in part by using the organization of personnel as an example.

Prior to September 1955 the laboratory was strictly a service department with no educational or research programs. There was no provision for night coverage, there was an extreme shortage of qualified personnel, and little or no liaison with other services. The present Director of Laboratories and the chief technologist developed a philosophy essentially as follows: "The purpose of the Hackensack Hospital laboratory shall

* Conference of Supervising and Administrative Medical Technologists—Read before the 28th Annual Convention of ASMT, Atlantic City, New Jersey, June 1960.

be to provide a service to the patient through the physician by establishing educational and research programs which will assure the patient and community of excellence in laboratory medicine."

It is thus obvious that the philosophy is cognizant of the three functions of a hospital laboratory, namely: service, education and research. In the development of this philosophy certain service objectives were established as follows:

1. Procurement of qualified personnel by the establishment of an approved hospital training school for medical technologists and through the recruitment of skilled technologists.
2. Establishment of an intravenous nurse team to collect all intravenous blood for laboratory examinations and to administer solutions and blood.
3. Provision for 24 hour coverage by qualified personnel.
4. Formal and informal meetings with other service departments and administration.

Administrative and personnel policies were then formulated on the basis of our philosophy and objectives.

The laboratory was divided into eight sections, namely: Bacteriology, including serology, parasitology, and mycology; Blood Banking; Chemistry, including urinalysis, basal metabolism and radioisotopes; Hematology; Histology, including cytology; Intravenous Nurse Team; Clerical; and Housekeeping. A section head was appointed or hired for each section. The intravenous nurse team which consisted of two registered nurses became a technical section of the laboratory and four additional registered nurses were hired. A more complete clerical department was established with two secretaries, two clerks, and one part-time clerk. The housekeeping section has one porter supplied by the Department of Hospital Sanitation, and two laboratory attendants or glassware washers hired by the laboratory directly.

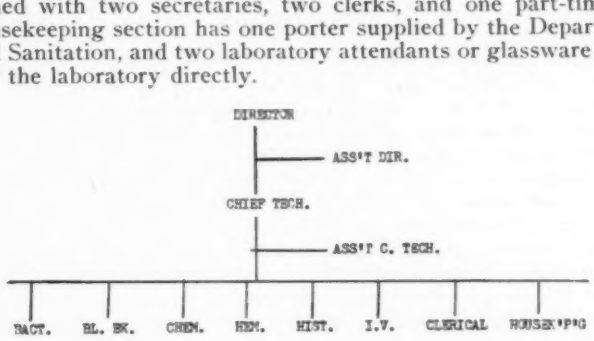


Figure 1

Our next step was to staff each section in conformance with the work load. Medical technology is a field which encompasses many sciences involving a diversification of skills ranging from the most simple to the most complex. A diversity of technically skilled individuals, therefore would be needed. Registered medical technologists were employed for section head, supervisory, quality control, teaching and investigative duties. Medical laboratory assistants were employed for the skilled but routine tasks. Medical laboratory aides were hired and taught to perform

routine uncomplicated procedures which previously took up much of the time of the registered technologists.

With such a diversity of personnel it became obvious that a method of ranking or classification was necessary to properly and fairly compensate each individual according to the educational, technical, and professional requirements of his job. A three year sliding pay scale with payroll classifications and job summaries were developed. A system of grades was established incorporating incentive increments and promotions within each classification.

The clerical personnel payroll classification is uniform throughout the hospital. The IV Nurse payroll classification was integrated with that of Nursing Service. The problem now was to relate the laboratory to other hospital professional services, the largest of which was the Nursing Service. Because the personnel organization of the nursing and laboratory services were similar, it was relatively simple to develop a laboratory grading system along educational, professional, and service requirements comparable to that in nursing. The starting salaries and increments are the same for both groups in each classification. Since salaries vary widely throughout the country, only the classification titles are referred to.

Equivalent Payroll Classification

Laboratory Service	*Nursing Service*
1. Section Head	Head Nurse
2. Registered Technologist, General Duty	Registered Nurse, General Duty
3. Graduate Technologist	Graduate Nurse
4. Medical Laboratory Assistant	Practical Nurse
5. Medical Laboratory Aide	Nurse Aide

For each classification there are grades. The Laboratory Section Head is equivalent to Head Nurse. Both positions require college degrees, registration with professional societies, and some experience in administration. The Registered Technologist, general duty is equivalent to the Registered Nurse, general duty. Both positions require three years of training, the general duty medical technologist having two years of college and one year internship in an approved hospital school, and the general duty nurse having three years of nursing school. The Graduate Technologist is equivalent to the Graduate Nurse. These are people who have completed the necessary educational requirements but have not taken or passed their respective Registry Examinations.

Medical Laboratory Assistant is equivalent to Practical Nurse. Both of these positions require some previous technical training or experience. Medical Laboratory Aide and Nurse Aide are equivalent. The individuals who have this payroll classification are usually high school graduates who are taught to perform certain specific uncomplicated laboratory procedures.

The following is an outline of the laboratory personnel payroll classification in use at the present time.

I Medical Technologist

A—Section Head
B—General Duty—Supervisory
C—General Duty—Non-supervisory

The classification medical technologist is used only for those individuals who have 2 or more years of college and are registered by the A.S.C.P.

II Medical Technicians
- A—Laboratory Assistant—Grade I
- B—Laboratory Assistant—Grade II
- C—Laboratory Aide—Grade I
- D—Laboratory Aide—Grade II

The classification medical technician is used to designate those who are not registered with A.S.C.P.

III IV Team
- A—Head Nurse
- B—Registered Nurse

IV Clerical
- A—Clerical Position 4
- B—Clerical Position 3
- C—Clerical Position 2
- D—Clerical Position 1

V Laboratory Attendant

Since the work load of the laboratory is not evenly distributed throughout the day, a system of 8 hour shifts to cover a 24 hour day was instituted. The following shows the number of 8 hour, 7 day week shifts presently employed:

7:00 a.m.- 3:30 p.m.
7:30 a.m.- 4:00 p.m.
8:00 a.m.- 4:30 p.m.
9:00 a.m.- 5:30 p.m.
10:00 a.m.- 7:00 p.m.
3:00 p.m.-11:00 p.m.
11:00 p.m.- 7:00 a.m.

As previously mentioned, there was no system of night coverage prior to 1955. For a period of almost four years after, a hit or miss system of constantly dredging up part-time people who would fill this void was tried. These people, most of whom were medical or dental students who had to be taught the STAT and emergency procedures, did not fulfill the standard of performance or emulate the professional qualities demanded of our day people. The collapse of this part-time night coverage was inevitable. The entire problem, therefore, was presented at a meeting of the technical staff of the laboratory. It was their decision that to keep their own house clean and in order, they would accept the responsibility for covering a 3:00 p.m.-11:00 p.m., and 11:00 p.m.-7:00 a.m. shift on a rotation basis. Needless to say, our night coverage problem was solved. The part-time program was abandoned, two additional technologists were hired and full time round the clock shifts were established. Because our technical staff recognized what was their professional responsibility, professional status was established with the institution of the new payroll classification just described.

We believe that medical technologists cannot delegate their professional responsibilities to others and still consider themselves profes-

sional. Professional connotes service. Our service is to the sick who are not ill only between the hours of 9:00 a.m. and 5:00 p.m.

In order to assure a proper system of control and method of communication, a chain of command was established. Problems in any section are brought to the section head. Many are settled at that level. If not, the section head brings them to the chief technologist, and if she cannot solve them, she will consult the Director. Section Head meetings are held each Wednesday at which time various problems relating to administration are discussed.

A Personnel Policies Manual was rewritten this year and presented to each member of our staff at our annual laboratory staff meeting.

Twice a year the chief technologist, in preparation for the semiannual departmental audit, confers with each member of the staff. At this time each individual has the opportunity to discuss her future, any problems she may have, and to make suggestions. At the end of each audit a conference is held with the Director of Laboratories and indicated changes in objectives or planning for the next six months are made.

In closing, it seems appropriate to quote a few lines from the opening paragraph of our Personnel Policies Manual:

"This manual has been prepared to facilitate your understanding of how the established policies of the laboratory affect you and your colleagues. It provides a mechanism whereby the majority of operational problems may be solved in an equitable manner. It attempts to prevent misunderstandings which might eventuate in serious disagreements. It is an outline of your rights and privileges.

"It is, however, only secondarily for the benefit of the laboratory personnel. The primary function of the laboratory, and indeed the only reason for its existence, is to provide a service to the patient. All other considerations are subservient to this. Your daily tasks are performed not for the chief technologist, the pathologist, the administrator or the clinician, but for some sick human being that you have probably never seen.

"There is a certain nobility to this situation which all too often escapes us. Our skills must be practiced gently as an art and never driven ruthlessly as a trade. We are professional people in the finest sense of the word. Our way of life involves concepts of integrity, service and education which irrevocably separate us from our counterparts in the world of industry."

ADMINISTRATION OF STUDENT EDUCATION IN THE CLINICAL LABORATORY*

MRS. MARJORIE ROBBINS, M.S., MT (ASCP)
Assistant Director, School of Medical Technology, Temple University, Philadelphia, Pa.

Student participation in a laboratory should be a learning experience for both staff and student, and can come about only by the awareness of the entire hospital administration. For the laboratory director and chief to realize the needs of a school is only the beginning. There is a Chinese proverb which aptly states "A student is like a sheet of paper upon which each passerby makes a mark." For a completely successful school and laboratory, each person within the institution must make his mark, and be aware of what he is doing. This includes everyone—dean, administrator, doctors, laboratory staff, nurses, patients, and other students. The job of establishing this, and evaluating the outcome falls on the laboratory or school administrator, who often is one and the same person.

The surest way to get a positive reaction from all these varied allied groups toward the school and its students is to give each a specific job to perform in connection with the students. Picking those that can add the most to each situation is a large but usually rewarding task. Common to many of us is the complainer against the laboratory and its workers. A person of this type often gladly accepts an invitation to lecture or act as consultant to the students, and most likely becomes a strong defender and advocate of the school upon becoming associated with it. Then there are those who feel their work is too remote to possibly be used in connection with a laboratory or its school. Here, we must be the ones to point out where the connection lies and to bridge the gap. Another type of individual we meet in developing a curriculum around the laboratory student is the one who says, "I don't mind talking on the subject, but I don't like students. They ask questions." Yes, they do, and since the time of Socrates the "question and answer" approach has led to many a good learning process. If we can get this person to lecture by volunteering to answer all questions that arise, we will soon have little to say as the question-answer period becomes accepted by the lecturer as his duty. For the one who feels he is too shy to speak before others, have him start by talking informally to one or two students, and as soon as he realizes the student has a need for his contribution, a conscientious teacher develops. The excuse "I do not have time" is invalid. Everyone has time and should feel enough pride in his profession to want those following him to know that which he has mastered. If the feeling of professional loyalty and pride is there, it permeates to the students and they will be there to gather gems of wisdom whether the lecture be early or late. I might add, that we find that if, as a student, one is given some teaching to do and is guided in this endeavor, the trend to teach carries over into the time when the student becomes a professional worker.

Continual alertness on the part of the administrator is essential to include all of these persons from the various facets of medicine into par-

* Conference of Supervising and Administrative Medical Technologists—Read before the 28th Annual Convention of ASMT, Atlantic City, New Jersey, June 1960.

ticipation with students, and once this type of an overall cooperative teaching of students is established, the administrator must place each part into a related whole. The important point is that the lecturing staff should include those essential to every phase of laboratory work and this should be broadened and enhanced by including a properly spaced number of lecturers from the field of medicine, nursing, administration, teaching, and other allied groups.

Once a good teaching schedule is developed and the staff is aware of its relation to the students' function in the clinical laboratory, then and only then should students be accepted into a school. Now that we are ready for the student, what are we looking for? Just wanting to be a medical technologist is not enough. The student must understand what our profession is and be able to accept this as well as for us to accept her. We all know what we like to see in an applicant—intelligence, adaptability, integrity, cheerfulness, and humor—and for these qualities we should hold out. Never choose a student just to fill the quota. Yes, we need medical technologists but we need good ones.

As the new requirements come into effect, more and more of us will be dealing with the student, not when he enters the hospital course, but actually before he starts his college career. With this will come the need for more advising and counselling on our part. Remember these students will be 2 to 3 years younger than we have been used to, and the basic patterns of study and achievement will not be as firmly set as those of the older student. Of course, I find that each year our 17 and 18 year old freshmen entering the university seem younger and younger. What has really happened is that in the past year I am the one whose age and outlook have altered, and must realize the change is in me and these young people are just as capable as were their predecessors.

Universities and colleges employ various entrance screening procedures, but the trend now is less on grades and academic achievement and more on citizenship, activities, and aptitude. Though less tangible than a test score, this type of selection can give us the superior student if selection is handled by capable, conscientious persons. In working with college students, no matter how carefully selected, we usually find 4 main groups:

1. The Honor Student
2. The Average Student
3. The Under achiever
4. The Academically Uninterested Student

Types 1 and 2 are no trouble to the adviser and a joy to watch in their professional development.

The third type, the under-achiever, is the one who often has been top or near top in his high school class, a model student, but away from home finds the adjustment too great and cannot cope with the pressures of college. This person may have shown excellent ratings on entrance tests and aptitudes. Educators spend much time on the study of this problem, and their conclusion is that little can be done to help this type since the basic problem has been established long before but did not manifest itself until more was demanded than he could adjust to

emotionally and socially. Poor grades and often hostility result, and even though he promises to do better and has his own reasons as to why his work is poor, he rarely improves and eventually must leave school because he cannot carry on academically or socially. Counselors at one college are now advising all who do not make grade averages expected of them to leave college for 1 to 2 years on the premise that time and experience will mature the person enough to re-enter school and do better. This program is too new to know how it will work, but we feel the student of this type should not be encouraged to remain in a school of medical technology where top performance is demanded.

The fourth and final classification of student commonly encountered is that of the academically uninterested. This person, usually a girl, is in college only because her parents have wished it and to gain social contacts. Mediocre progress and eventually leaving school is the expected pattern. These students are easily spotted and should be counselled out of medical technology early.

In the realm of student selection is included one of an administrator's most difficult jobs—that of telling someone he is not to become a medical technologist because we and our advisers know he is not good material; but we must tell him for the sake of the student himself, the school, the other students, and the profession. Working with the college in an advisory status gives us a decided advantage in knowing the student entering the laboratory phase of training and the level of work expected from each student can be fairly well predicted. However, occasionally there is one who has done well in college courses but who either dislikes the laboratory atmosphere or is unable to relate fact to function. This student should be advised as quickly as possible that he is not in the right field, and should be transferred to a less scientific field.

With the laboratory staff, the lecturers, and the students well screened and well versed in their respective roles, a worth while program develops, but the administrator cannot yet relax, for his is the job of seeing that each instructor carries out his part of the whole, that lecture and laboratory instruction are adequate and well prepared, and that the lectures are so spaced as to make them easily assimilated and related to the technical work.

A constant checking of the students' progress must be made. We know what has been presented, and now we must check on what the student has absorbed and how well he will use this knowledge. Testing, by the laboratory department, the lecturer, and by the administrator is essential. All types of tests should be given—comprehensive, essay, multiple choice, and practical exams both scheduled and spot. Grade sheets, check lists, and interviews facilitate this phase, and a permanent record must be kept so that we have a progress report on every student at our fingertips at all times. From this data, the student's potential in the field should be discussed with him so that each is aware of his limitations and capabilities as a professional worker.

When students are accepted into the laboratory, administrators must maintain a constant watch over the entire program set around the student and be able to select and advise the staff in teaching, counsel students, integrate the technical and didactic material presented, establish

a checking system, and prepare each candidate for his place in the professional world of medical technology. This is a large but rewarding task for student participation in the laboratory is rather like painting a picture. First all materials are obtained, then the scene is set, and finally the actual picture is painted. And what emerges for us?—The professional Medical Technologist.

MEDICAL TECHNOLOGISTS WANTED

Registered Technologist (ASCP), Female. Salary $550. per month. Night Calls for one week for every four. ($5.00 per call). Apply to Drs. Flynn and Keye, Pathologists, Mercy Hospital, Redding, California.

Wanted: Medical Technologist, ASCP registered, for genetic biochemical research study. $4800-$5000. Studies involve serum electrophoresis but experience in this field not required. Apply: Caylor-Nickel Research Foundation, 316 South Main St., Bluffton, Indiana.

ASCP Registered Medical Technologist—Female. Salary range $395 to $445 per month for 40 hour week. Outstanding 309 bed modern teaching hospital on Northwestern University campus on Lake Michigan. Excellent cultural and recreational facilities nearby. Attractively furnished kitchenette apartments available at cost for single or married persons. Liberal employee benefit program including 3 week paid vacation, 18 days paid sick leave per year and 50% tuition reduction on courses at Northwestern University. Apply Personnel Relations Department, Passavant Memorial Hospital, 303 E. Superior, Chicago 11, Illinois.

Laboratory Technologist, ASCP certified or eligible, wanted for career opportunity in all-purpose medical group in up-state New York. 40 hour week; liberal benefits program; salary commensurate with training and experience. Rip Van Winkle Clinic, Hudson, New York.

Expansion Program, moving from 350 bed hospital to new ultra modern 465 bed Riverside Methodist Hospital, located in beautiful suburban area near Ohio State University. Will need 3 to 5 additional ASCP registered technicians. Attractive salary, 40 hour week, no night work, generous vacation and sick leave policies. Apply immediately to John Forrer, Director of Personnel, White Cross Hospital, 700 N. Park St. Columbus 15, Ohio.

Wanted: Medical Technologist MT (ASCP), 150 bed general hospital. 40 hour week, 2 week vacation and other benefits. No night call unless desired to increase income. Approved Technology School. Pathologist supervision. Graded salary depending on qualifications starting at $375 per month. Contact L. F. Thornton, M.D., Memorial Hospital, Lawton, Oklahoma.

Chief Medical Technologist: ASCP registered for 154 bed general hospital primarily for care of Samoan people. Full charge two local technicians and two trainees. Qualified to perform all hospital laboratory work and instruct local technicians. Transportation paid. Furnished quarters with utilities $28 to $36 per month. Free medical and dental care and hospitalization. 10 weeks paid leave at termination two year contract. Send detailed resume education, experience, availability and salary requirements to: Personnel Officer, Government of American Samoa, Pago Pago, American Samoa.

Medical Technologists, degree and registration. Wanted for a variety of assignments in the clinical laboratories in the University of Minnesota hospitals. Starting salary $416 per month regular increases to $506. Excellent benefits and working conditions. Some Supervision of student technologists. Apply: Civil Service Personnel, University of Minnesota, Minneapolis 14, Minnesota.

Medical Technologist—MT (ASCP)—Position available in large, expanding hospital located on Milwaukee's lake front. Salary structure based on experience; 40 hour week. Two full time pathologists, two pathology residents and School of Medical Technologists. Apply, S. B. Pressin, M. D., St. Mary's Hospital, 2320 North Lake Shore Drive, Milwaukee 11, Wisconsin.

Research Assistant needed in (Surgical Pathology Department) at Ohio State University Health Center. ASCP registration preferred. Some training and experience in tissure preparation is necessary. Beginning salary—$350.00 per month with increase annually for four years. Paid sick leave, annual vacation, group hospitalization, group life insurance and retirement plans available. Please apply by letter or in person to Dr. Dan Elliott, Room A423, Starling-Loving, 410 W. 10th Ave., Columbus 10, Ohio—Ohio State University Health Center.

Medical Technologist, ASCP registered for 60 bed hospital located in ski and summer resort area. 40 hour week, $450 per month plus liberal personnel policies. Apply Norman P. Schauer, Administrator, Littleton Hospital, Littleton, N. H.

Laboratory Technologist wanted for new 35 bed Accredited hospital. X-ray experience preferred but not essential if willing to learn. Salary $400.00 per month plus 3 meals a day, laundry of uniforms, hospitalization insurance, sick leave, paid vacation, annual increments. Calls to be alternated with other technologists. Apply: Lyon Health Center, Box 547, Yerington, Nevada.

Night Technologist: MT (ASCP) Eligible or 2 years college plus laboratory experience. 510 bed private, non-profit, non-denominational hospital. Laboratory semi-departmentalized, air conditioned, recently remodeled. Excellent working conditions, 2⅓ weeks paid vacation, legal holidays, overtime pay, etc. Starting salary based on experience (minimum approximately $450 month). Please include training and experience with inquiries. Write or call: Richard Myers, Aultman Hospital Laboratory, Canton 10, Ohio.

Medical Technologist, ASCP certified or eligible, for Rheumatism Research. $3600 and up. Excellent Medical Plan. Tuition exemption to 6 semester hours. Next door to lakes and mountains. Send resume to Personnel Office, University of Vermont, Burlington, Vt.

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THE LABORATORY CENSUS—ITS FORM AND USE*

GRACE MARY EDERER, B.A., M.T. (ASCP)
University of Minnesota Hospitals, Minneapolis.

The use of an efficient and accurate counting or census system is essential to the effective administrative operation of any Laboratory Service. In 1951 at the annual meeting of the American Society of Clinical Pathologists (ASCP), the pathologists expressed the need for a uniform method of counting laboratory procedures in order to compare the work load of one laboratory with another. In Table I, an example is given of the type of difficulty one may encounter in making comparisons of laboratory census figures where no agreement exists as to method of counting procedures.

TABLE 1

	Hospital Laboratory A (200 bed; 2 technologists)	Hospital Laboratory B (200 bed; 2 technologists)
Urinalysis	6,000 (counted as 1 Procedure)	30,000 (counted as 5 Procedures)
Complete Blood Count	12,000 (counted as 3 Procedures)	4,000 (counted as 1 Procedure)
Total	18,000	34,000

In the above tables, if the totals only were considered, the question might well be raised; "Why can't Laboratory A double its volume without additional help?" Obviously, additional volume without additional help might not be justifiable purely on the basis of comparison with Laboratory B since the work load of each laboratory is identical but is counted differently.

As a result of the interest in this problem the President of the American Society of Clinical Pathologists appointed Dr. D. R. Mathieson[1] as Chairman of a six man committee to study the problem of standardization of laboratory census reporting systems. In 1952 the committee conducted a survey study of the census reporting systems for laboratory tests of the Army, Navy, U.S. Public Health Service, Veterans Administration, and large and small private and public hospitals.

As a result of this survey and study the committee then initiated a "Trial Form with Explanatory Notes," and formulated rules to follow to maintain uniformity in counting. The Trial Form was completed in 1954 and copies were sent to a limited number of pathologists in different parts of the country for trial and for constructive criticism.

Since the results of the trial run indicated that the proposed form was workable, the American Society of Clinical Pathologists authorized the expenditure for printing and distribution of the form to its total membership. After further review by the membership, certain modifications of the explanatory notes were made which have improved the census system.

Tables 2 and 3 summarize the revised rules proposed by ASCP in 1957 to be used as a standard system for counting and reporting clinical laboratory tests.

* Conference of Supervising and Administrative Medical Technologists—Read before the 28th Annual Convention of ASMT, Atlantic City, New Jersey, June 1960.

TABLE 2

General Rules for the ASCP Census System

1. The basic plan consists of grouping according to TYPE OF TEST and SOURCE OF SAMPLE. Purpose: to condense monthly and annual reports into a few pages and permit qualitative and quantitative comparisons.
2. Multiple tests are counted as one; example, urea clearance, glucose tolerance etc.
3. Examinations indicated by "amount," "appearance," etc. are NOT to be counted unless the specimen has been submitted solely for the purpose of having one or more such examinations done.
4. Seven sources of material are listed; Blood, Urine, Feces, CSF, Gastric, Sputum and Others. These sources for each type of test are totaled. A GRAND TOTAL is obtained.

TABLE 3

Specific Rules for the Six Categories of Tests*

1. Bacteriological	— count each culture on a single specimen as ONE test.
	— count each animal inoculated as ONE test.
	— smears are reported under MICROSCOPICAL.
2. Chemical	— count each test performed as ONE test.
	— report the following multiple tests as ONE test; urea clearance, glucose tolerance, duodenal drainage, PSP.
	— count total protein, albumin and globulin as TWO tests—report under Chemical: protein, total and albumin.
	— count urine sugar, acetone and diacetic as separate tests.
3. Immunological	— count each test performed on a serum sample as ONE test.
	— count each bacterial antigen used as ONE test.
	— flocculation tests for syphillis reported here.
	—count ABO blood grouping as ONE test.
	— count each Rh slide test and each tube test as ONE test.
	— count "Cross match" as ONE test.
4. Microscopical	— count each specimen examined microscopically as ONE test.
	— count each specimen examined for exfoliated malignant cells as ONE test. Indicate source.
	— count CSF fluid cell counts under differential.
	— count CBC (red blood count, white blood count, hemoglobin and differential) as FOUR tests.
5. Other	— include urinalysis here; count ONE for complete urinalysis (includes color, specific gravity, reaction, sugar, albumin and microscopic).
6. Surgical Pathology	— count as ONE all specimens removed on which only a gross examination was done.
	— count as ONE all specimens on which both a gross and microscopic was done.
	— count as ONE every microscopic section, (NOT slide) examined.

A comparison was made of the same census figures from a Bacteriology Laboratory of a University Hospital compiled first under the departmental system (table 4) and then under the ASCP system (table 5).

There are many advantages and disadvantages in every reporting system. The ASCP form is shorter, has fewer pages, but a great deal

* (A complete set of ASCP Report forms and Explanatory Notes for Reporting Clinical Pathology Tests, etc. as revised in 1957 can be obtained from Whiting Press, Rochester, Minnesota for $4.00 per set of 25.)

TABLE 4
Bacteriology Census
July 1, 1958 - June 30, 1959

Cultures:	Blood	7,103
	Urine	5,558
	Drug Room	1,039
	G.C.	164
	Nose	1,346
	Throat	4,736
	Sputum	1,108
	Stool	806
	Cerebrospinal Fluid	566
	Yeast and Fungi	756
	Body Fluids	435
	Abscesses and Wounds	1,343
	Miscellaneous	1,578
Smears:	Acid-fast	1,195
	G.C.	21
	Gram	1,726
	Miscellaneous	57
KOH:	Preparation	15
Typings:	Pneumo	5
	Hemophilus	5
Agglutination:	Salmonella	29
	Shigella	7
Sensitivities:		2,709
Hospital Cultures:		1,309
Totals		33,616

TABLE 5
Revision of a Bacteriology
Census According to ASCP Form
1958-59

TEST	MATERIAL							
	Total	Blood	Urine	Feces	CSF	Gastric	Sputum	Others
Bacteriological								
Animal inoculations	....	....	....	....	....	....	....	....
Cultures, ordinary bacteria	27,091	7,103	5,558	806	566	....	1,108	11,950
Cultures, tubercle bacilli	....	....	....	....	....	....	....	....
Cultures, fungi	756	....	....	....	....	....	....	756
Sensitivity tests	2,709	....	....	....	....	....	....	2,709
Vaccines	....	....	....	....	....	....	....	....
Immunological								
Agglutination, bacterial	46	....	....	....	....	....	....	....
Agglutination, erythrocyte	....	....	....	....	....	....	....	....
Microscopical								
Cell counts, sperm	....	....	....	....	....	....	....	....
Cell counts, eosin, total	....	....	....	....	....	....	....	....
Sediments	....	....	....	....	....	....	....	....
Smears, ordinary bacteria	1,804	....	....	....	....	....	....	1,804
Smears, tubercle bacilli	1,195	....	....	....	....	....	....	1,195
Smears, fungi	15	....	....	....	....	....	....	15
Smears, "L-E" cells	....	....	....	....	....	....	....	....
Smears, malignant cells	....	....	....	....	....	....	....	....
Smears, parasites	....	....	....	....	....	....	....	....
TOTALS	33,616	7,103	5,558	806	566	....	1,108	18,475

of information may be obscured under the heading, "OTHER." For example 6,082 Nose and Throat cultures make up almost one half of the total of 11,950 cultures from this undesignated source. The number of Nose and Throat cultures vary seasonally so it would be helpful to have this information documented separately to anticipate staffing demands during certain months. The separation of the tests into different categories according to the nature of the test may make it difficult to judge easily the total work load of a particular section of the laboratory. For example under the category IMMUNOLOGICAL all of the Blood Bank procedures would be counted on a completed ASCP Report Form besides those Immunological tests usually assigned to Bacteriology as the bacterial agglutinations.

The ASCP form assures more uniformity of reporting, which is helpful in making comparisons of census totals between laboratories. As laboratories progress into automation, it may be well to report procedures performed on automatic instruments separately on the Report Forms. Likewise, sensitivity studies should be further qualified as: tube dilution, or disc method since the time factor for each method is considerably different.

Quality is an entity that cannot be documented or counted. Every professional person concerned with the evaluation of laboratory census figures should keep this prime goal of all laboratory procedures in mind when drawing conclusions from the census figures available.

The grand total for each SOURCE of specimen does not appear to be very helpful in work load analysis. An example of such totals according to source of specimen is shown for a 300 bed hospital in Table 6. This information was provided by Dr. D. R. Mathieson.

TABLE 6
Total Laboratory Census
1954
A 300 Bed Hospital—8,805 Admissions—233 Average Daily Census

Total	Blood	Urine	Feces	CSF	Gastric	Sputum	Other
130,790	83,270	34,119	1,861	1,557	487	2,719	6,777

It is often difficult to make major changes in long established census systems. However, medical technology shares with others the responsibility for improving laboratory census systems and directing them toward more uniformity. The following objectives may be used as a guide in census reporting.

1. Define standard rules for counting laboratory tests; the ASCP rules as revised appear to be concise, clear and workable.
2. Accumulate census figures in the way most useful to the individual laboratory in its special situation.
3. Whenever the pattern of an individual system lends itself to the ASCP form, use this system.

Once the reporting system has been standardized, the statistics accumulated can be used to accomplish certain useful functions.

1. To Estimate and Substantiate Requests for More Staff.

Various yardsticks for measurement of personnel needs have been used in the past. Steinle[6] cautions against the use of general rules or ratios. In spite of this counsel, many laboratories use a ratio of one technologist for every 10,000 tests performed each year in estimating needs. Other laboratories have found that this figure should be lower (1 technologist per 8,000 procedures per year) in order to allow time to develop new and often more time consuming techniques. From careful consideration of past experience according to documented census figures and staffing records prediction of future growth can be made and therefore anticipation of future personnel needs can be more correctly estimated.

2. To Estimate and Analyze Work Load.

Starkey[5] developed a system of weighing one procedure against another to arrive at a "unit value" for each test. A few of the unit values developed by Starkey are shown in Table 7.

TABLE 7

Unit Values of Starkey	Unit Value
Urinalysis—Routine	1
Hb., Wbc., Sed. Rate	1
Differential	4
BUN, Glucose	4
Culture, Routine	8
Smear, Gram	1
Smear, T.B.	4

According to Starkey, a technologist working in a large laboratory can produce 2,000-2,200 work units per month. Referring to the census figures of a Bacteriology Laboratory as shown in Tables 4 and 5, there were 2,151 work units done per month by each technologist in this laboratory during this same period. This figure agreed with the "educated guess" that this laboratory was adequately staffed.

It is useful to evaluate past work load but it is even better to anticipate future work load. As an example of how the unit value system might be useful, assume that the medical staff of a particular hospital has agreed that a white blood count and a differential count will be done on all admissions in addition to the hemoglobin determination and urinalysis required at present. Assume that there were 10,000 admissions per year. The work unit value of a white blood count and a differential equals 5 or 50,000 work units per year for the 10,000 admissions or approximately 4,000 work units per month increase in work load. By using the value of 2,000 work units/technologist/month, this laboratory would need to increase its staff by two technologists.

If a laboratory is to use the unit value system of analyzing work load certain other problems should be given consideration. These include the following:

1. The location of the laboratory in relation to the patient floors.
2. The physical lay-out of the particular sections—too little or too much space.
3. Traffic patterns in the laboratory because of lay-out.

4. Laboratory policies on specimen collection.
5. Amount of emergency work—should it be weighed differently?
6. Abilities of the technologists and of the professional staff.
7. Size of the staff.

Many factors and systems have been developed for analyzing the work of Clinical Laboratories. Such factors have been developed as, the Standard Laboratory Man Hour,[2,4] Tests per Man Hour,[2,3] Optimal Balance Factor[3] and the Productivity Index.[3] In attempting to use these systems occasional discrepancies occur between the established figures given by the author of the system and those of the laboratory testing the system. If marked deviations in findings occur, especially when the prediction would indicate agreement, the counting system of the laboratory concerned should be examined carefully to make certain that it is comparable to the counting system of the author.

3. **Compare with other Hospital Laboratories.**

The statistics accumulated in the laboratory census should be used with discretion when comparisons are made even with seemingly identical clinical laboratories. It is possible to arrive at erroneous conclusions unless conditions are carefully controlled. However, before any comparison can be considered, standardized rules of counting and reporting must be established. When this has been done, in certain study situations, it would be rewarding to compare statistics with another standardized laboratory in order to make predictions or corrections.

Summary

1. A review of the American Society of Clinical Pathologists system of counting and reporting of laboratory tests is given with a discussion of the advantages and disadvantages of the system.
2. The use of the laboratory census for estimating requests for more staff, for estimating and analyzing work load, and for comparing with other hospital laboratories is discussed.

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WELL COUNTING MODIFICATION OF SCHILLING ($Co^{60}B_{12}$) TEST†

FRANCES CARVER, M.T. (A.S.C.P) and KATHERINE KOLANDER, B.S.
Radioisotope Laboratory, Permanente Medical Group, Oakland, California

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We are grateful for the assistance of L. V. dos Remedios, M.D., Nuclear Physician; and Edgar J. Schoen, M.D., of the Permanente Medical Group, Oakland, California.

The superiority of a closed-well counter over the *in vivo* probe counter in the performance of the Schilling test has been demonstrated in the experiment described below.

The Schilling test as modified by Tabern and Storey[1], a valuable and accurate procedure in diagnosis of pernicious anemia, is based on the inability of persons with that disease to absorb vitamin B_{12} from the intestinal tract due to deficiency of intrinsic factor. It consists* of the oral administration of radioactive vitamin B_{12}, which is flushed into the urine by a large dose of nonradioactive vitamin B_{12}. Low 24-hour urinary excretion values of radioactive vitamin B_{12}, correctible to normal values by the administration of intrinsic factor, are considered indicative of pernicious anemia. The urine is usually tested for radioactive vitamin B_{12} by means of an *in vivo* probe. This report compares the *in vivo* probe counting method with one involving the use of a closed-well counter. Using the described methods, a minimum of ten determinations at each of seven consecutive dilution levels was made by the *in vivo* probe technique and by the closed-well counting technique. The results shown in the table are for the same samples as counted by each of the two methods.

Methods

Standard Method:

Step 1: Two hours after the oral administration of 0.5 microcuries of Co^{60} labeled vitamin B_{12} in capsule form*, all patients received a flushing dose of 1000 micrograms of vitamin B_{12}, injected intramuscularly. The urine was collected for 24 hours after the time of administration of the capsule. The radioactivity of the total 24-hour urine sample was determined quantitatively. If less than 10% of the administered radioactive dose was recovered in the 24-hour specimen, a repeat dose of 0.5 microcuries of Co^{60}-labeled vitamin B_{12} was given, accompanied by a capsule containing concentrated intrinsic factor**, and a flushing dose of vitamin B_{12} was again given two hours later. (In pernicious anemia, the administration of intrinsic factor increases the percentage of radioactivity recovered in the 24-hour specimen to normal values; i.e., more than 12% of the administered dose[2].)

Step 2: For counting, the patient's urine and reference standards were deposited in geometrically similar bottles of 1000 ml. capacity. Total 24-hour urine specimens measuring less than 1000 ml. total volume were

* The procedure is here summarized with the permission of author and publisher.
† Received for publication January 1960.
** Supplied by E. R. Squibb & Son.

increased to 1000 ml. by the addition of water. Specimens measuring more than 1000 ml were divided into two or more bottles, and the volume in each was made up to 1000 ml. with water. Each sample, background, and standard was counted for a minimum of 10 minutes; thus, the total counting time for one test was a minimum of 30 minutes. Counts were made by means of an *in vivo* probe with a 1-inch sodium iodide crystal. The calculation was one of simple proportion:

$$\% \text{ Excreted}^* = \frac{\text{CPM Unknown}^\dagger}{\text{CPM Standard}} \times \% \text{ Standard}$$

Modification of Standard Method:

Step 1 of the standard method was followed.

Step 2: Standards were prepared in various percentages of an original dilution of 1000 ml. as in the standard method. The patient's 24-hour total urine specimen was measured for volume. Fifty milliliter aliquots of the standards and of the patient's urine were counted in the closed well in 50 ml. Erlenmeyer flasks for 5 minutes each. The calculation was one of simple proportion:

$$\% \text{ Excreted}^* = \frac{\text{CPM Unknown}^\dagger \times \text{Total Volume} \times \text{Standard } \%}{\text{Standard CPM} \times 20 \times 50}$$

* Per cent of ingested dose of cyanocobalamin.
† Net counts per minute.

The Tracerlab "1000" Scaler was used for counting. Counting was performed in a standard closed well with a 1.5-inch sodium iodide crystal. (In order to facilitate placing the flask, the beta shield, which had a flanged neck, was removed.)

Results

The results are summarized in Table I. The closed-well counting

TABLE I

Comparison of Results Achieved by Application of *In Vivo* Probe Method Versus Well Counter Method to a Minimum of 10 Samples at Each Level of B_{12} Dilution

B_{12} Content (Calculated Percent of Administered Dose)	IN VIVO PROBE METHOD		WELL COUNTER METHOD	
	Total CP 10 M*	Percent Probable Error†	Total CP 5 M**	Percent Probable Error†
5	1840	13.3	2290	3.7††
10	2250	6.0	1885	3.2
15	2690	5.0	2520	2.6
20	3070	4.0	3455	1.9
25	3650	3.2	3795	1.9
30	4280	2.6	4695	1.7
35	4840	2.3	5585	1.5
Average per cent probable error	....	5.2	....	2.4

* Total counts per 10 minute period, mean of 10 determinations with average background of 141 CPM.

† Per cent probable error $= \sqrt{\frac{\text{Total counts} + \text{background counts} \times 100}{\text{Net counts}}}$

** Total counts per 5 minute period, mean of 10 determinations with average background of 80 CPM.

†† Because of very low activity range in samples of 5% or less, the counting time was increased to 10 minutes.

method reduced by one half the time required for counting, and reduced the per cent probable error to approximately one half that associated with the *in vivo* probe method. The smaller quantities of solution needed for testing with the closed-well counter obviated storing the large 1 liter bottles used for the *in vivo* probe method.

Summary and Conclusions

In the performance of the Schilling test, the closed-well counting method is more accurate than the *in vivo* probe method, is completed in less time, and reduces storage space requirement.

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Continued Page

THE LABORATORY RECOGNITION OF CORYNEBACTERIUM HEMOLYTICUM*

GEORGE J. HERMANN, M.S., *Microbiology Diagnostic Unit,*

Communicable Disease Center, United States Department of Health, Education and Welfare, Atlanta 22, Georgia

Corynebacterium hemolyticum was the designation given by MacLean, et al., (5) to a hemolytic Gram positive rod isolated from throat, ear, and skin infections which occurred in the native population and American military personnel stationed in the South Pacific area during World War II. The extent of human infections on the U. S. mainland with *C. hemolyticum* is not known; however, infections with this organism do occur, and one of the purposes of this report is to alert laboratory personnel to this fact. Within a two year period, 1958-59, eight strains which have been identified as *C. hemolyticum* were received at the C.D.C. Microbiology Diagnostic Unit. The criteria utilized in arriving at the conclusion that these eight strains were *C. hemolyticum* are reported here because this organism is not listed in Bergey's Manual, 7th Edition, (2), and the description given in Topley and Wilson, 4th Edition, (10) is brief and does not serve adequately for identification purposes.

Methods

The eight strains were received from five different states. Four cultures originated from a single state, and one each from four other states. Five of the strains were isolated from the throat and one each from ear, blood, and leg lesion. In addition, a culture of *C. hemolyticum*, ATCC 9345, was obtained from the American Type Culture Collection, Washington, D. C., for comparison purposes.

The nine strains were plated to heart infusion agar (Difco) containing 5% v/v defibrinated rabbit blood, which is the routine plating medium used in this laboratory. Because human or sheep blood is used by various laboratories to make blood agar, defibrinated blood from these two sources was also used with the base medium in the same quantity for preparing blood agar plating medium. Gram stains were made from 24 hour colonies on blood agar and from growth in serum-enriched heart infusion broth. The growth from Loeffler's medium was also stained by the Gram method and with alkaline methylene blue.

Colonies from blood plates were picked to heart infusion agar slants and to the same medium containing two or three drops of sterile defibrinated rabbit blood. Tubes of heart infusion broth, unenriched and enriched with 0.2 ml. of sterile rabbit serum, were also inoculated with a colony of each of the nine strains. Fermentation tests were done using heart infusion broth to which was added brom cresol purple indicator. Seitz-filtered carbohydrate solutions (10 percent) were added to the base to make a one percent final solution.

Other biochemical tests were performed using, in general, the procedures outlined in the *Manual of Methods for Pure Culture Study of Bacteria of the Society of American Bacteriologists.* (6) All media were prepared from the appropriate Difco products. The basal media employed in the test and exceptions to the outlined procedures were as follows: (1) catalase—test for

* Received for publication August 1960.

this enzyme, which must be done on a blood-free medium, was performed by adding hydrogen peroxide solution to the growth on a heart infusion slant which had been incubated for 48 hours; (2) indol—serum enriched tryptone (2 percent tryptone) broth cultures incubated for 48 hours were extracted with xylol and tested with Ehrlich's reagent; (3) nitrate reduction—serum enriched 2 percent peptone plus 0.2 percent KNO_3 broth incubated for 48 hours tested with Griess-Illosvay reagents for nitrate reduction; (4) hydrogen sulfide production—TSI medium was streaked on the slant and stabbed into the butt, and lead acetate papers were suspended from the mouths of these tubes over the slant growth; (5) gelatin liquefaction—heart infusion broth plus 12 percent gelatin was inoculated with a drop of serum broth culture, incubated at 37° and tested for liquefaction each day by immersion in ice water; (6) action on litmus milk; (7) motility test—motility medium was used. Antibiotic sensitivity tests were performed by the disc method, using blood agar plates as the medium for growth.

Rabbits and guinea pigs were inoculated intracutaneously with 0.2 ml. of a 48 hour serum broth culture. Four hours after the initial inoculation, the rabbits were given 1000 units of diphtheria antitoxin by the intravenous route. The guinea pigs were given 200 units intraperitoneally three hours after the initial inoculation. Rabbits received the control injection immediately after administration of antitoxin. The guinea pigs were injected with the control one hour after antitoxin administration. Mice were inoculated intraperitoneally. Antitoxin was not used with the mice.

An antiserum was prepared by intravenous injections of rabbits with an overnight incubated formalin killed serum broth culture of the ATCC strain 9345. A total of nine injections, three injections per week, spaced over a three week period were given. The quantity of injections were: First week—0.1 ml., 0.2 ml., and 0.5 ml.; Second week—0.5 ml., 0.5 ml., and 1 ml. Third week—1 ml., 1 ml., and 2 ml. One week after the last injection, the animals were bled by cardiac puncture and the serum collected. This serum was tested with all nine strains using as antigen acid-heat extracts for capillary precipitin test according to the Lancefield procedure. (7) As a control on technique, the nine strains were tested by the same procedure with an antiserum against Group A *Streptococcus**. A Group A *Streptococcus*** was tested with the homologous grouping serum and antiserum ATCC 9345.

Results

Cultural and Staining Characteristics:

Colonies on rabbit and human blood agar plates averaged about 0.5 mm. after 24 hours incubation; a narrow zone of hemolysis 1 mm. in total diameter was below the colony. Clear zones of hemolysis were noted in stabs made at the periphery of the plates during the course of streaking. At 48 hours colonies averaged 1 mm. in diameter. The zones of hemolysis were much larger than at 24 hours, averaging 3 to 5 mm. in diameter. Sheep blood agar is not as good a medium as rabbit or human blood agar. Colony size on sheep blood is much smaller, averaging only 0.1 mm. in size in 24 hours. Hemolysis is either absent or is so narrow that it escapes notice unless the plate is held up to the light when the colonies are viewed. Hemolysis in the

* The antiserum for Group A **Streptococcus** was obtained from the Diagnostic Reagents Section, C.D.C.

** Obtained from the Staphylococcus and Streptococcus Laboratory, C.D.C.

stabs is narrow and hazy. At 48 hours the colonies are approximately 0.5 mm. The zone of hemolysis around an individual colony is narrow, averaging only about 1 mm. Sheep blood was inferior to rabbit or human blood both from the viewpoint of growth and hemolysis detection.

Stains made from 24 hour colonies on blood agar plates revealed slender Gram positive rods. The rod-shaped morphology was maintained in serum broth in which the organisms grew well. Morphology on Loeffler's medium was suggestive of *C. diphtheriae*, although metachromatic granules were not seen in the cells. Individual cells, however, take up the stain unevenly and the areas of Gram positivity contrasted with the de-stained areas may be misinterpreted for granules. Growth on heart infusion agar slants without blood is dysgonic. Growth in broth is finely granular. The granules settle to the bottom, leaving a clear supernatant. The addition of a little sterile serum greatly stimulated growth to the extent that the broth medium became slightly turbid upon inspection.

Biochemical Reactions:

Fermentation reactions in the base medium listed were slow and irregular. Because of the stimulation of growth by serum, 0.2 ml. of sterile rabbit serum was added to each tube of brom cresol purple infusion broth containing the following carbohydrate solutions: dextrose, xylose, mannitol, lactose, sucrose, maltose, trehalose, and glycerol. In the serum base carbohydrate medium all nine strains fermented dextrose, lactose, maltose, and trehalose within 48 hours. Sucrose was fermented by only two of the nine strains. Glycerol was fermented slowly, requiring three to seven days with the various strains. Mannitol and xylose were not fermented. Catalase was not produced. The test for indol was negative. Nitrates were not reduced. Hydrogen sulfide was not formed in the butt of TSI medium, although growth occurred in the butt along the line of stab. The lead acetate paper suspended over the slant of this medium was blackened. The degree of blackening was quite strong within three days of incubation when the slants were inoculated with sufficient inoculum. Gelatin was not liquefied within 14 days. Litmus milk was clotted by seven of the nine strains. Clotting was not apparent until after seven days incubation. Two strains did not clot the milk. The milk was not digested, nor was the indicator reduced by any of the nine strains.

Antibiotic Sensitivity:

The ATCC culture and one of the eight cultures received for identification were found sensitive by the disc method to penicillin, erythromycin, chloromycetin, aureomycin, streptomycin, and terramycin. Both strains were resistant to polymyxin B. The other six strains were not tested.

Pathogenicity Test:

Intracutaneous injection of the rabbit resulted in the production of an intense area of erythema which became elevated with an accumulation of pus in the lesion. Some necrosis developed around the center of the lesion which reached maximum development in about 48-72 hours. Ulceration of the lesion developed, leaving a punched-out central area which was still present after healing. The lesion in the guinea pig was similar in character except that the

erythema was not as intense and the amount of pus present was not as great as in the rabbit lesion. Diphtheria antitoxin did not control the reaction in the animal skin. The reaction was not due to a filterable toxin, since Seitz-filtrates of the broth cultures failed to elicit any reaction in the animals' skin. Pathogenicity for mice was not impressive. In order to consistently produce death 0.5 ml. of a 24 hour serum broth culture was required for intraperitoneal injection.

Serology:

Serological tests were only preliminary in nature. The agglutination test could not be used because the antigens agglutinated in physiological saline. Antiserum prepared against the one strain, ATCC 9345, precipitated extracts of the other eight strains. No absorption tests were done, and the precipitation by the one serum indicates only antigenic relationship, but not antigenic identity which can only be established by reciprocal absorption test with serums prepared against the other strains. Non of the extracts of the nine strains were precipitated by Group A *Streptococcus* antiserum nor was a Group A *Streptococcus* extract precipitated by antiserum ATCC 9345.

Discussion

The organisms reported upon in this paper are consistent with the description of *C. hemolyticum* reported by MacLean, et al. These authors did not perform the catalase test upon their strains. However, the strain deposited by one of the authors (Liebow) with the American Type Culture Collection *C. hemolyticum*, ATCC 9345, was similar to the eight strains identified in this laboratory with respect to this and its other biochemical, cultural, morphological, and animal pathogenicity characteristics.

No clinical history accompanied the specimens received in this laboratory except to give the source. The clinical observations of MacLean, et al. who isolated 118 strains from 114 patients in the Pacific area during World War II showed that the respiratory tract was the most common source, with skin lesions being second in frequency. Thirty-six cases of respiratory infection yielded *C. hemolyticum* and no other associated pathogen upon culture. Clinical records were available on only 18 of these 36 cases which revealed the diagnosis of acute tonsillitis in twelve, chronic tonsillitis in two, otitis media one, bronchitis two, and focal pneumonia one. The organisms produced lesions when injected into the skin of human volunteers. Clinical histories and results of experimentation on animals and humans indicate the organism is pathogenic.

Barksdale, et al., (1) report that *Corynebacterium pyogenes* gives rise to mutants which are indistinguishable from *C. hemolyticum*. The mutant differed from the parent strain in its inability to ferment xylose, lack of soluble hemolysin production, and absence of glucose in its cell wall. Also, the mutants were found to be nonproteolytic; whereas, the parent strains of *C. pyogenes* were proteolytic, clotting and digesting skim milk, as well as liquefying gelatin rather rapidly. Catalase activity was detected in *C. hemolyticum* by Barksdale, et al., when fresh extracts were obtained by breaking organisms up in a Mickle disintegrator; whereas, similar treatment of *C. pyogenes* strains failed to show any catalase activity. As these authors suggest, this is a large number of changes to be manifested in a single mutation.

The lack of proteolytic activity by the strains identified as *C. hemolyticum* in this laboratory was one of the main factors in differentiating these organisms from *C. pyogenes*. Both *C. pyogenes* and *C. hemolyticum* gave negative catalase tests using the method employed in this laboratory for catalase detection.

The bacteriologist who processes throat cultures for streptococci and *C. diphtheriae* is the person who is most likely to encounter *C. hemolyticum* on his isolation plate. The tellurite media of Frobisher (3) and Kellogg and Wende (4) inhibit the growth of *C. hemolyticum*, and these organisms would not be isolated from throat cultures plated to these media. A serum tellurite medium such as that of Whitley and Damon (9) supports growth of these organisms which are serophilic in nature. The organisms would be less likely to be picked from a throat culture plated to sheep blood agar than from agar medium containing rabbit or human blood because colony size and hemolysis is better on the two latter blood plates.

A hemolytic Gram positive rod isolated from human throat, ear, or skin lesion, which maintains its rod-shaped morphology in fluid media and is found to be *catalase negative*, should be suspected as *C. hemolyticum*. Poor growth on solid and fluid media without blood or serum is another characteristic which should alert the bacteriologist to the assumption that the organism may be *C. hemolyticum*. The inability to produce H_2S in TSI stabs is a single method of differentiating this organism from the catalase negative, Gram positive rod *Erysipelothrix insidiosa*, which produces H_2S by this method in TSI stabs. (8) The *Lactobacilli*, which are also catalase negative, Gram positive rods, can most simply be differentiated by their ability to grow upon tomato juice agar, which does not support the growth of *C. hemolyticum*. The negative catalase test differentiates this organism from *C. diphtheriae* and the majority of diphtheroids encountered in human nose and throat cultures.

The classification of both *C. pyogenes* and *C. hemolyticum* in the genus *Corynebacterium* is questioned by Barksdale, et al., who feel that both of these organisms should be classified with the streptococci. Regardless of the eventual classification of these organisms, their recognition and identification in the laboratory is necessary for their further incrimination as a source of human infection.

Summary

1. The occurrence of human infections with *C. hemolyticum* on the U. S. mainland is verified.

2. The laboratory criteria necessary for the identification of this organism and its differentiation from other bacteria which may resemble it on morphological or cultural basis are reported.

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